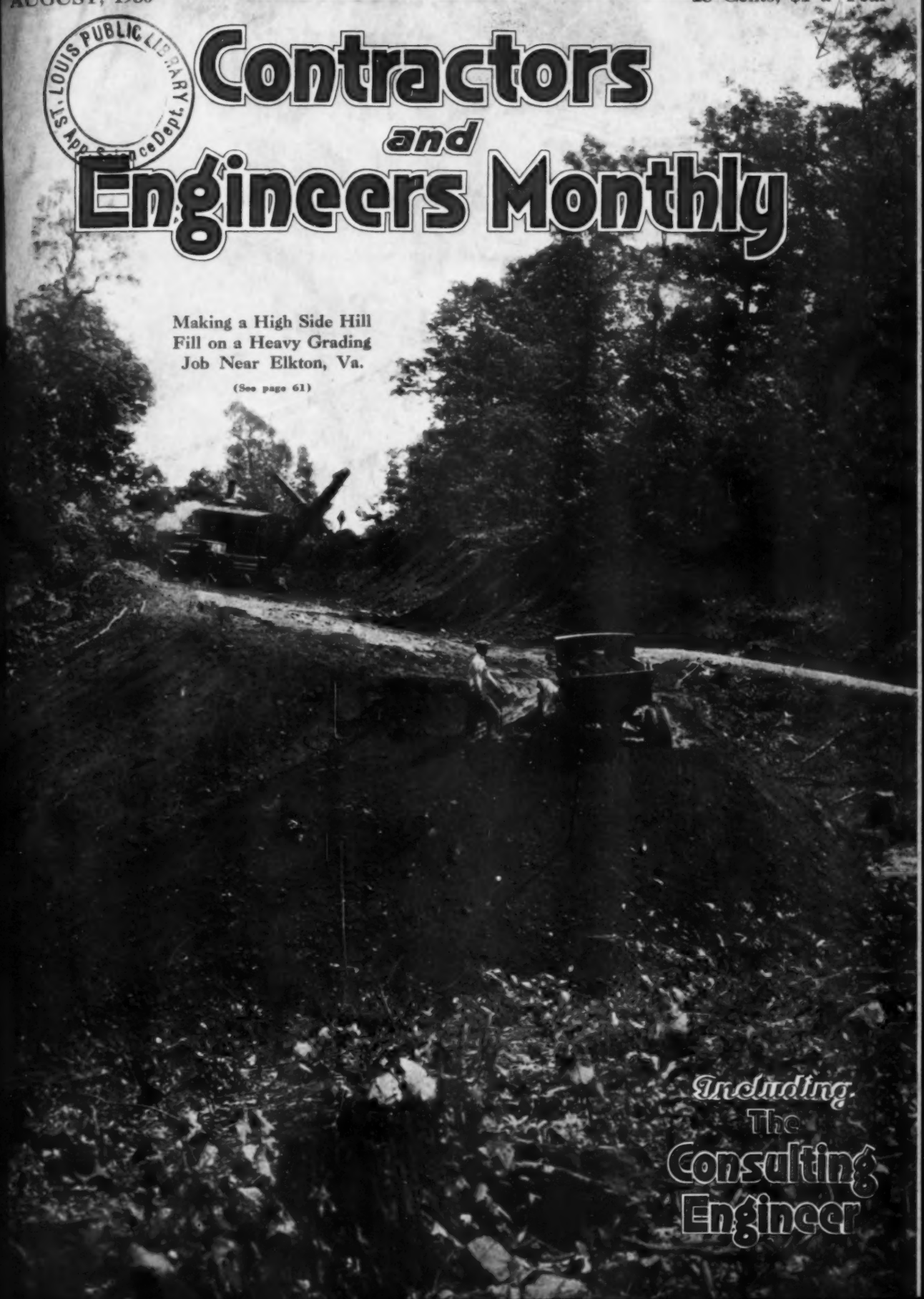
AUGUST, 1930

25 Cents, $1 a Year

Contractors and Engineers Monthly



Making a High Side Hill Fill on a Heavy Grading Job Near Elkton, Va.

(See page 61)

Including The Consulting Engineer

Vol. XXI No. 2 CONTRACTORS AND ENGINEERS MONTHLY, AUGUST, 1930 Price, 25 Cents; $1 a Year
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Jim Jones—

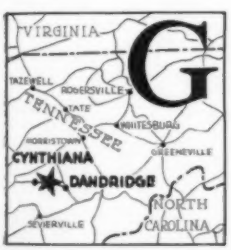
Protective

Operator

The Reason for Fewer Breakdowns and Longer Life of Equipment on Roberts Paving Company Work

Stiffleg Derrick Lifting Stone Skip from River Barge to Stockpile

With Sand and Gravel Dredged from River Contractor Regularly Pours Better Than Four Hundred 6-Bag Batches a Day



GREAT spurts for records of big yardages don't pay dividends. It is usually the case that if everything is set for a big pour on one day and a record is made then the next day there is a big let down and the average of the two days does not look so good. The Roberts Paving Co., of Salisbury, Md., does not believe in spurts but by a system of small bonus payments to the operators of machines they maintain their equipment in such fine condition that the breakdowns are fewer and the equipment lasts longer, making the investment pay better.

On each piece of equipment for which one man is responsible such as the rollers, paver, finisher, etc., there appears a small sign with the name of the operator and the words "Protective Operator." At the end of each week's work the Superintendent turns in a report to the home office showing whether there have been any delays in the work due to the failure of a man to keep his machine in first rate condition through oiling and necessary adjustments. For every man with a clear record for the week the company sets aside five dollars which is paid to him at the end of the calendar year. Thus a careful operator can net a tidy little sum for his working weeks if he has taken good care of his machine. Breakdowns which cannot be charged to lack of care on the part of the operator are not held against him. But, just think what this means in the longer life of the equipment. The bonus payments are repaid to the company over and over again in the longer working years of each piece of machinery. Multiply this by the number of jobs that this company is running and you can appreciate that a vast amount of capital is being held intact and depreciation vastly lessened.

This is a feature of all Roberts Paving Co. jobs but the particular job to which this article is to be devoted was located at Dandridge, Tenn., and had a number of outstanding features all its own. The job ran between Dandridge and Cynthiana, Tenn., a distance of 11.32 miles and consisted of an 18-foot slab with an 8-6-8-inch cross section. The work was known officially as Project 228-A, Jefferson County, Tenn., and was bid at $235,820.16. The concrete amounted to 119,448 square yards and was bid at $1.92.

Aggregates Dredged from the French Broad River

The sand and gravel were produced just above the Free Bridge at Dandridge about 1 mile from the end

of the job. The Louden Sand & Gravel Co., of Lenoir, Tenn., operated two floating bucket dredges in the river. The material was run through a screen on the dredge and the proper sizes of gravel and sand delivered to skips on barges floating alongside. The skips of 2½ and 2¼-yards capacity were carried 9 or 7 per barge, depending on the size of the barge. A stern paddle tow boat run by a 2-cylinder gas engine moved the barges and the dredges as needed. The barges were brought alongside the batching plant just below the Free Bridge and the skips unloaded by a wood derrick operated from the bank by an American 2-drum steam hoist and niggerhead. The skips were emptied behind wood barricades with separate storage for the sand and gravel.

One of the Signs Showing the Name of the Man Responsible for the Care of the Equipment

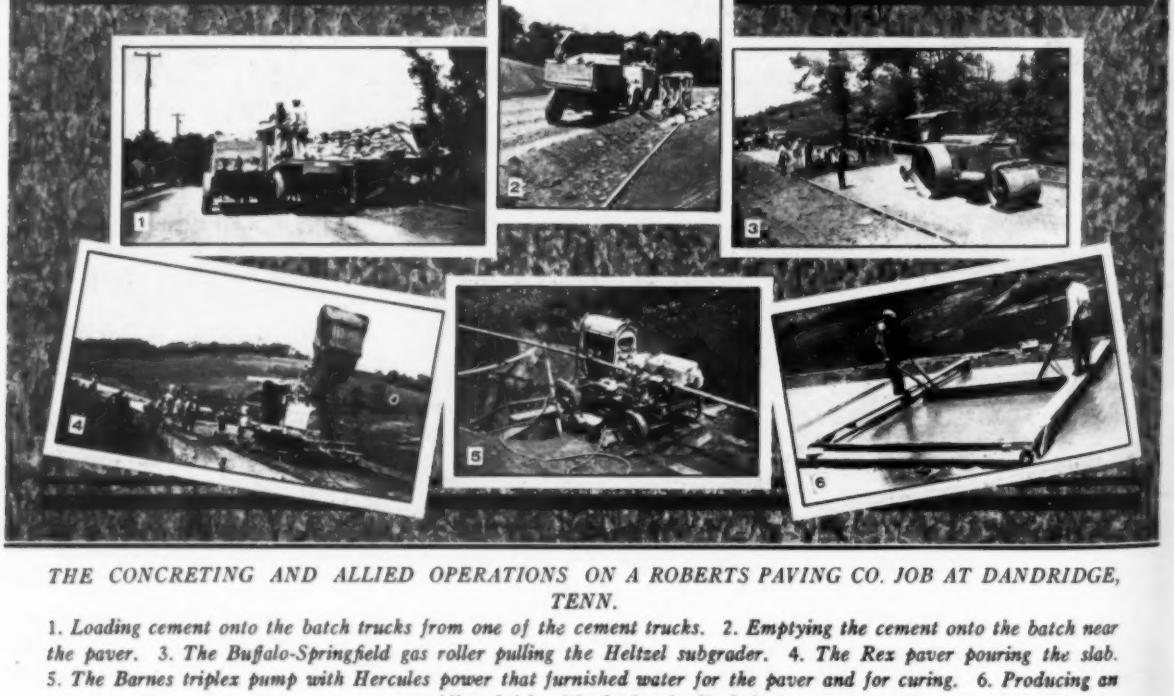
A Lorain 75A crane loaded from the stockpile to the Blaw-Knox batchers. The average batches which varied very slightly because of the uniform supply of aggregates were made up of 2,491 pounds of gravel, 1,275 pounds of dry sand corrected for moisture, and 6 bags of Penn-Dixie cement. The trucks of the hauling contractor, the Ellison Hauling Co., North Wilksboro, N. C., drove down a one-way road and were turned at a wide turnout on a Blaw-Knox turntable, backing under the batcher. A rather novel device was made up by the inspector to save a lot of shouting to spot the 2-batch trucks under the batchers. Two pointers were located close to the truck driver with cords run up to the batcher. If the truck was too far back for the first batch the cord operating the forward pointer was pulled and it automatcially rang a bell to attract the driver's attention. Similarly when the truck was to be moved back to the other indicator was used.

CEMENT TAKEN ON EN ROUTE

The Penn-Dixie cement was hauled from Jefferson City, Tenn., by another hauling contractor and the trucks spotted at the edge of town. The batch trucks drove by, stopped and received the 6 bags of cement on each batch. They then drove on and about ¼-mile from the paver stopped at a platform where one man jumped aboard and cut the bags and then two others emptied them on the batches. The hauling contractor received a flat rate for hauling the batches as weighed at the batcher. The trucks turned on the subgrade ahead of the forms if convenient or at a point about 500 feet from the paver if the forms were set that far ahead.

FINE GRADE

On the fine grade an Adams leaning wheel No. 14 grader with a 12-foot blade was pulled by a Monarch 75 to cut the rough grade to approximate elevation.



THE CONCRETING AND ALLIED OPERATIONS ON A ROBERTS PAVING CO. JOB AT DANDRIDGE, TENN.

1. Loading cement onto the batch trucks from one of the cement trucks. 2. Emptying the cement onto the batch near the paver. 3. The Buffalo-Springfield gas roller pulling the Heltzel subgrader. 4. The Rex paver pouring the slab. 5. The Barnes triplex pump with Hercules power that furnished water for the paver and for curing. 6. Producing an easy riding finish with the longitudinal float

One man went ahead and shovelled out the stakes which has been covered by the grader pushing the earth onto the shoulders and checking the fine grade for the benefit of the grader operator. Two men and a Western rotary scraper followed, pulling out dirt at the edge and cleaning up ahead of the form setters.

SMALL GRADER CUT THE FORM TRENCH

A light Adams grader pulled by a team was used to cut the form trench ahead of the hand gang. Eight men and a foreman kept the Blaw-Knox set better than 500 feet ahead of the paver. The fine grade was rolled by a 10-ton Buffalo-Springfield gas roller. As soon as the forms were set a subgrade planer made from a Heltzel drag scraper, designed for use behind the paver, was pulled ahead by the roller and a rotary scraper put in to remove the surplus dirt.

WHAT THE CONCRETING CREW ACCOMPLISHED

For the last payroll in May the concreting crew averaged 415 batches a day with a 1¼-minute mix. On one day when everything was running particularly well a total of 514 batches were placed in 12½ hours giving 1,504.2 feet of pavement. But as was said at the beginning of this article it is not the big runs that count, it is the consistent high average that produces dividends.

THE CREW THAT PUTS IN THE SLAB

There were two very good reasons for the progress shown on this job: the first that the contractor, who started work on April 1, 1930, lost only one week because of weather conditions up to the end of May when he had used only 33 of his 125 allowed working days and had completed 8.5 of the 11.32 miles of paving; the second was the close attention paid to the concreting organization. Most contractors feel that they do not begin to make money on a job until the concrete is going in and that is very true for every other operation is subordinate to the final one of pouring the slab.

Ahead of the paver one boy cleaned the forms and oiled them and one man dumped the trucks. The paver operator who was responsible for his machine oiled it during the day as needed and the night watchman gave it a thorough greasing and oiling at night. There were two men who put in the Truscon center strip and with the dump man they handled the hose when a shift was made. There were two men shovelling from the Heltzel drag board pulled by the paver. The dowels for the center strip were carried on the drag board and the center strip itself on the paver under the operator's platform. There were only three men in the concrete and they handled the spading, shovelling and carrying to the strike-off of the Ord finisher. There was one operator for the finisher. Two men hand finished, using a 10-foot longitudinal float from twin bridges 12 feet apart mounted on wheels running on the forms. These same two men used the Heltzel straight-edge. Two other men did the edging and belting, using a flat belt. A second belt for the final finish was used back of the first.

CURING

The contractor had two men putting the 3 x 20-foot strips of burlap over the finished concrete. The strips were carried on a Heltzel rolling bridge. The earth curing was done by subcontract and sprinkled for 10 days.

PERSONNEL

Project 228-A was built by the Roberts Paving Co., of Salisbury, Md., with M. R. Rea as Superintendent. For the State Department of Highways and Public Works, R. J. Love was Division Engineer with C. H. Giles as Resident Engineer on the work.

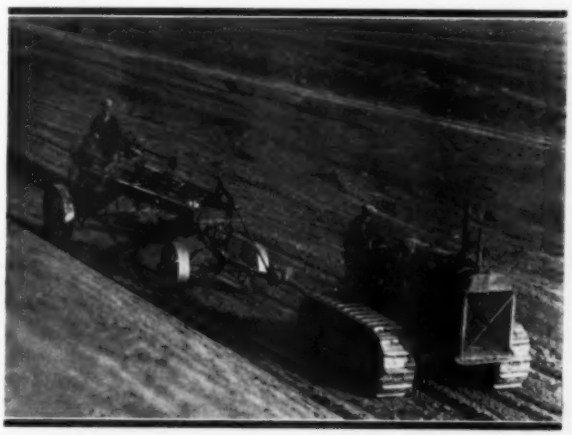
Handbook of Culvert and Drainage Practice

A 349-PAGE handbook has recently been published by the Armco Culvert Manufacturers Association, Middletown, Ohio, covering culvert and drainage practice and containing diagrams, charts, photographs and information as to the best methods for designing culvert structures and for building them.

The volume is divided into nine sections which discuss drainage requirements, research which has been undertaken in drainage materials, soils, durability of culverts, etc., the design of culverts, including the prevention of bank erosion and other specialized construction details, subsurface drainage, municipal and subdivision drainage, including an important chapter on airport drainage and another chapter on the causes of and cures for land slides, land reclamation by drainage and field instructions for installing corrugated metal pipe, large diameter pipe and the use of the jacking method for such installations. The concluding section consists of general tables of great help to engineers.

As far as is known, this is the only book which covers the important subject of culvert and drainage practice alone, giving data on research and design and the solution of practical drainage problems. The book was prepared by a staff of experienced engineers and has been reviewed by a number of recognized authorities.

The price of the book is $2, but copies may be secured by practicing engineers and contractors by writing direct to the Association or to any member of the Association on his business letterhead.



CATERPILLAR TAKES ONLY 28 DAYS FOR WORLD'S BIGGEST SHAVE

The end of the biggest shave in history. This reservoir at Clyde, Calif., is nearly 2 miles around. Using a Caterpillar and a Russell Super-Mogul grader, the contractor trimmed the 2 to 1 slopes, 11 inches deep in 28 days where the usual hundreds of workers would have required every day of the 100 contract days allowed

Accident Prevention *and* Costs

By

J. W. Cowper

President, John W. Cowper Company, Inc., Buffalo, N. Y.

AS a rule, contractors, from the beginning of time, have been put on the defensive, being under an owner, architect, and so on. Although many subcontractors feel that they are too aggressive, generally contractors feel themselves to be on the defensive. One of the greatest steps in accident prevention, however, is to reverse that form and be on the aggressive.

The financial question of accident prevention is one of the most important phases of the subject. The changing conditions of the job and the excessive cost of doing the job bring about very close competition, all of which means that the contractor must be able to bid low enough to meet competition and at the same time make enough profit to stay in the business.

In these days of intense competition, the contractor needs to know his costs, one very considerable item of which is compensation insurance. The average rate in most states is about $5 for every $100 of pay roll. In New York State, excluding steel erection which runs from 25 to 30 per cent, including public liability, the average rate runs about 7 per cent. This rate, of course, may be and is modified by the individual contractor's experience. If he has few and small losses he may receive a credit even up to 25 per cent. But if he has not had satisfactory experience, he may run into the debit column, even as high as 25 per cent.

Changing Conditions

Building conditions are changing. One of the most important of these changes from the point of view of accident prevention is the increased height of buildings. This increases the possibility of serious accidents. More machinery is used in construction which has introduced new and greater hazards. There is often a less orderly arrangement and storage of materials which necessitates more handling. And it is a well known fact that the handling of materials is the most frequent cause of accidents to workmen on construction jobs.

Attention to Little Things

Experience points out that the larger and more serious the accidents are, generally the more easily they are prevented, as compared with the smaller ones. The minor or smaller accidents grow into serious cases from lack of proper attention. A man sticks a nail in his foot, or injures his hand handling some material, and it is very difficult to persuade him to go to the office for treatment. From such injuries as these develop infections, blood poisoning and such serious cases which often result in permanent disability.

Results of Accidents

In addition to the direct cost of insurance, there are many hidden costs due to accidents, which authorities estimate are five times greater than the direct losses. Some of these are the loss of the services of good men through disability, slowing up of the job for that reason, with a consequent increase of overhead expenses, and the necessity of replacing such men with new and inexperienced help. Another is the lack of morale and team work. Good men will not stay on a job where there are too many accidents. The men must be constantly on the alert for fear of being hurt and they cannot work as rapidly nor as efficiently. Waste of time of foremen, superintendents, time keepers and of the men when an accident occurs is another result.

Prevention Through Education

Most accidents are due to the men themselves and the best prevention is through the education of the men. Some people advocate safety codes and various kinds of legislation, but one cannot legislate safety. It must be in the man. We have to educate the men to think in terms of safety and to act accordingly. And there is nothing that requires more vigilance and constant effort on the part of those higher up than the matter of accident prevention.

The idea must be sold to the builders and contractors first. Every man must be sold on the idea himself and then in turn must sell the man under him. And after he is sold, he must be checked up on and reminded of it and resold for everyone grows lax even about things they are in theory heartily in accord with.

Cooperation Important

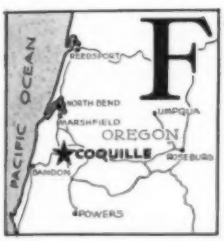
There is no place in the world where it is so important to have the absolute cooperation of every man

(*Continued on page 54*)

Drainage Outlet Control Built on Unstable Foundation

Fat Elk Drainage Ditch Before Starting Installation Operations of Battery of Six 72-Inch Armco Pipe and Calco Gates

Unique Methods of Handling Construction Problem Near Couquille, Coos County, Oregon



FAT ELK CREEK Drainage District, situated near Couquille, in Coos County, Oregon, consists of approximately 2,400 acres of fertile cultivated and grazing land. The runoff of the average rain-fall of 72 inches from this area together with the overflow from the river above the district which drains a large area of rough timber land is carried off by the Fat Elk Creek drainage ditch which flows into the Couquille River. This river at the point of outlet, is subject to a tidal variation of from 3 to 6 feet in addition to the difference in water level due to flood conditions. These conditions have necessitated a system of drainage control that would permit outflow at low water and prevent backflow during high tide and flood time.

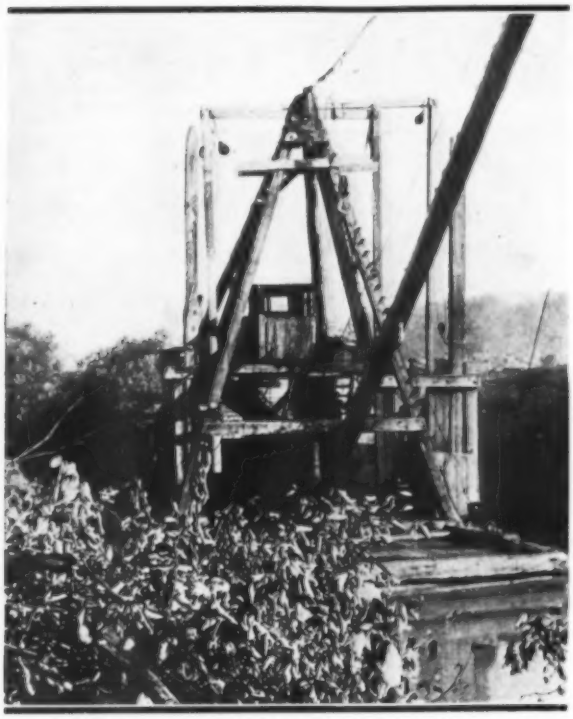
In the past this control was provided for by one 36-inch, one 48-inch and two 72-inch Calco drainage gates which automatically controlled the outflow and inflow of water. These installations proved satisfactory as to performance but were inadequate as to capacity, making it necessary to replace them with a larger structure.

The Pipe Was Floated Into Place in This Novel Manner at High Tide. With the Fall of the Tide the Pipe Was in Place and the Logs Floated Free

Prior to the above installation, this district had experienced a costly rigid gate failure due to unstable foundation conditions. Timber installations had also proved unsatisfactory from a maintenance standpoint. For these reasons it was decided to secure the needed greater capacity by a larger installation similar to that which was still giving good service after a period of 14 years. To give the required capacity, a battery of six 50-foot lengths of 72-inch Armco corrugated iron pipe, each fitted with a Calco drainage gate, was used. Engineering ingenuity combined with a product particularly suited to the installation conditions at hand, resulted in the entire project being placed quickly and economically.

Methods Used in Installation

A floating dredge was first used to widen and clean out the drainage ditch. Plans called for the pipe to be laid 9 feet center to center, thus leaving a space of 3 feet, or one-half the diameter, between each pipe. Two cedar piles were driven between the pipe at each end as part of the timber bulkhead to be erected later.



The Floating Dredge Which Was Used to Clean and Widen the Ditch

One line of fir piling was driven on a center line between the pipe to which the cross-tie, hold-down timbers were to be attached.

After the excavation had been made and the necessary piling driven, the sections of pipe, which were fabricated and hauled to the job in such lengths that three sections totalled 50 feet, were placed on a barge and joined by field riveted connecting bands. This double precaution was taken to insure a joint of sufficient strength to defy separation in the unstable foundation conditions. Air drills and hammers were used in this work.

PIPE FLOATED TO PLACE

After being connected, two slings were placed around the pipe which was then lowered into the water to a depth sufficient to allow a 48-inch spruce log, 65 feet long, to be floated into the pipe. The pipe was then lowered until its total weight of 11,000 pounds was supported by the log. At high tide the pipe was towed into place by one man and anchored. As the excavation was made to such a depth that the pipe would remain submerged to a depth of 5 feet at low tide, the logs were free to be removed with the ebbing of the tide. This left all the pipe with one exception, resting securely upon the foundation that had been prepared for them. At the next high tide this pipe was floated out again, the foundation leveled and the pipe refloated into place. With the next low tide the log was released and floated free, leaving all the pipe in place.

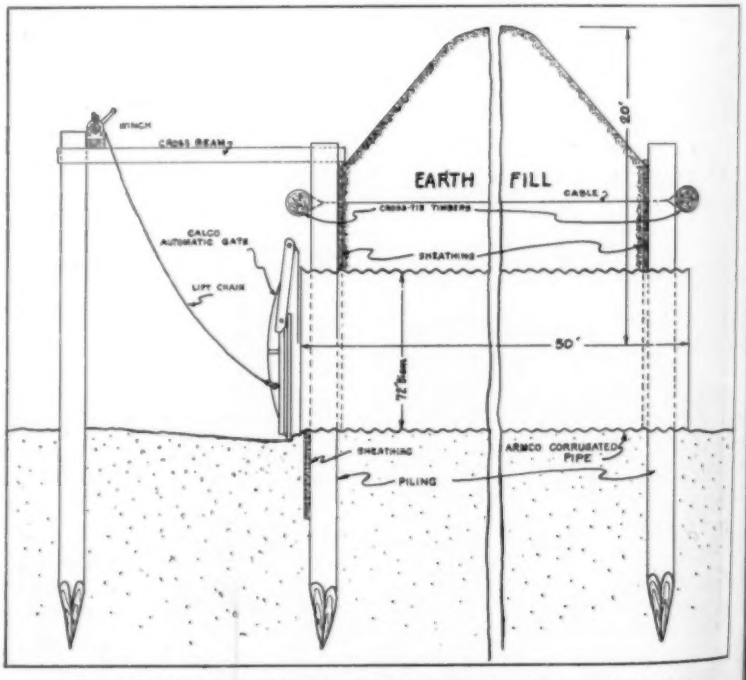
The cross-ties previously mentioned were attached to the piling driven for this purpose. The purpose of these cross-ties was to keep the pipe from rising out of position while the fill was being placed.

BULKHEADS AND BACKFILL

The timber bulkheads and wing walls were built up to a height 4 feet above high tide level. Special precautions were taken to prevent the undermining of the bulkhead on the gate side of the installation. A trench was dug at the edge of the pipe. In this trench a timber cutoff wall, assembled on the bank, was placed. Saddles were cut in the top plank at 9-foot intervals to accommodate the pipe. In order that this wall could settle with the pipe it was fastened to the piling by means of iron straps. The bulkhead was securely braced by two lines of cross-tie cables stretched between each two successive pipes and securely fastened at each end to a log placed horizontally on the outside of the piles near the top.

Fill up to the top of the pipe was made by the dredge using material excavated from the bottom and banks of the ditch. By allowing this wet material to drain out during low tide, sufficient stability was secured to complete the fill with wheelers and fresnos, making a very solid fill. When the fill was completed to a height of 20 feet above the center line of the pipe, it was found that, as expected, the pipe had settled a distance of about 2 inches. To allow for uneven settlement due to concentrating the weight of the fill in the center, the foundations for the pipe were prepared with a slight camber. This resulted in an even flow line.

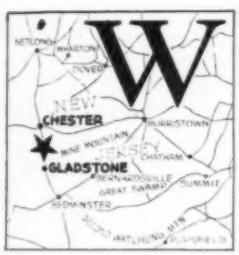
(Continued on page 63)



A Cross Sectional View Showing Detail of Construction of the Drainage District Outlet

New 20-Foot Concrete Road— 100 Per Cent Relocation

S. J. Groves & Sons Start Concreting Early After Winter Grading on New Jersey Job



WORK on the 4.83-mile concrete paving job on Route 31, Section 5, between Chester and Gladstone, N. J., was started by S. J. Groves & Sons, Minneapolis, Minn., through the eastern division office at Ridgefield, N. J., on October 26, 1929. The job involved 103,300 cubic yards of earth excavation at 60 cents, 10,000 cubic yards of rock at $4.00, 57,798 square yards of concrete, 9 inches thick, at $2.70, 57,106 square yards of improved stone or slag shoulders, 10 feet wide, at $.45 a square yard, to be treated with two coats of asphaltic oil with a cover of sand on each. The job was practically 100 per cent relocation, straightening a rather winding grade of an old heavily traveled asphalt macadam road.

On rough grading one Ingersoll-Rand portable air compressor, one Sullivan portable air compressor and four Chicago-Pneumatic jackhammers were employed in preparing the holes for breaking up the rock. Two Lorain-75 gasoline shovels and one Lorain-75 crane, which worked on the shoulders, handled all of the dirt moving with a fleet of trucks.

Drainage Structures

The drainage structures included two 48-inch reinforced concrete pipes, two 30-inch reinforced concrete pipes, nine 24-inch reinforced concrete pipe drains, four 18-inch reinforced concrete pipe drains, eleven 18-inch cast iron pipe drains, five 24-inch cast iron pipe drains and a considerable length of underdrain with 6-inch vitrified clay pipe.

Fine Grade

The fine grade for the job was handled expeditiously with complete mechanical equipment, including Riddell Warco graders, one Adams grader with a 12-foot blade, two Caterpillar Sixty tractors with bulldozers, one Wehr Pup roller and a Lakewood subgrader. A crew of 12 men took care of all the hand work on the fine grading, while 4 of these men were used in setting the 9-inch Blaw-Knox forms.

Water Supply

Water from a creek at the one-third point of the job was supplied by a Barnes triplex pump with a Domestic duplex booster on the 2½-inch water line, which was equipped with taps at 300-foot intervals.

Hauling Batches

Batched sand and gravel were purchased from the commercial plant of the Gallo Sand & Gravel Co., Netcong, N. J., an 11-mile dead haul over a new concrete road. All hauling was done by a fleet of hired trucks which included eleven 4-batch trucks and two 3-batch trucks. One of the subcontractors on hauling, A. C. Sherrer, Hackettstown, N. J., used a fleet of Hahn trucks with Steckel bodies equipped with St. Paul hoists.

The Gallo batching plant consisted of a 3-compartment Erie AggreMeter with an Osgood crane and Blaw-Knox 1-yard Dreadnaught clamshell bucket which handled the sand and stone from adjacent stockpiles.

Cement was hauled by hired trailers from the Edison plant at New Village, N. J. These trailers were parked at convenient points along the job and a separate truck, manned by three men, dropped the bags into the skip for each 7-bag batch of 1:1.56:3.5 concrete.

The forms were well tamped to solid foundation with a spade underneath and the handle of a shovel along the base. The excellent subgrade maintained ahead of the paving helped the trucks to operate quickly and minimize the number of broken springs.

Concreting

Concreting started on May 1, 1930, a date set several weeks in advance, showing the precision of operations. The first day's concreting showed a minimum of trouble and a well finished slab.

The concreting crew consisted of 2 men setting bulkheads and steel, 4 men spading and puddling, 2 men shoveling against the screed of the Ord finisher, a finisher operator, the paver operator, and 2 hand finishers with a helper. The bulkhead men divided the duties of oiling the forms and sprinkling the subgrade. The rein-

forcing used consisted of Truscon spot welded fabric and the standard six ¾ x 20-inch dowels across the bulkhead of ½-inch Elastite expansion joint. One end of each dowel was covered with a paper tube and supported on a bent bar chair. The chairs and paper tubes were set on the side of the bulkhead away from the paver which was run outside of the forms, thus maintaining the integrity of the subgrade without additional labor.

Salt hay spread and sprinkled by 3 to 4 men was used for curing, as this is a Federal Aid project and the contractor's application for the use of an asphalt emulsion for curing was turned down by the U. S. Bureau of Public Roads. The grade was 5 per cent, the maximum curve 3 degrees and the total contract price approximately $315,000.

PERSONNEL

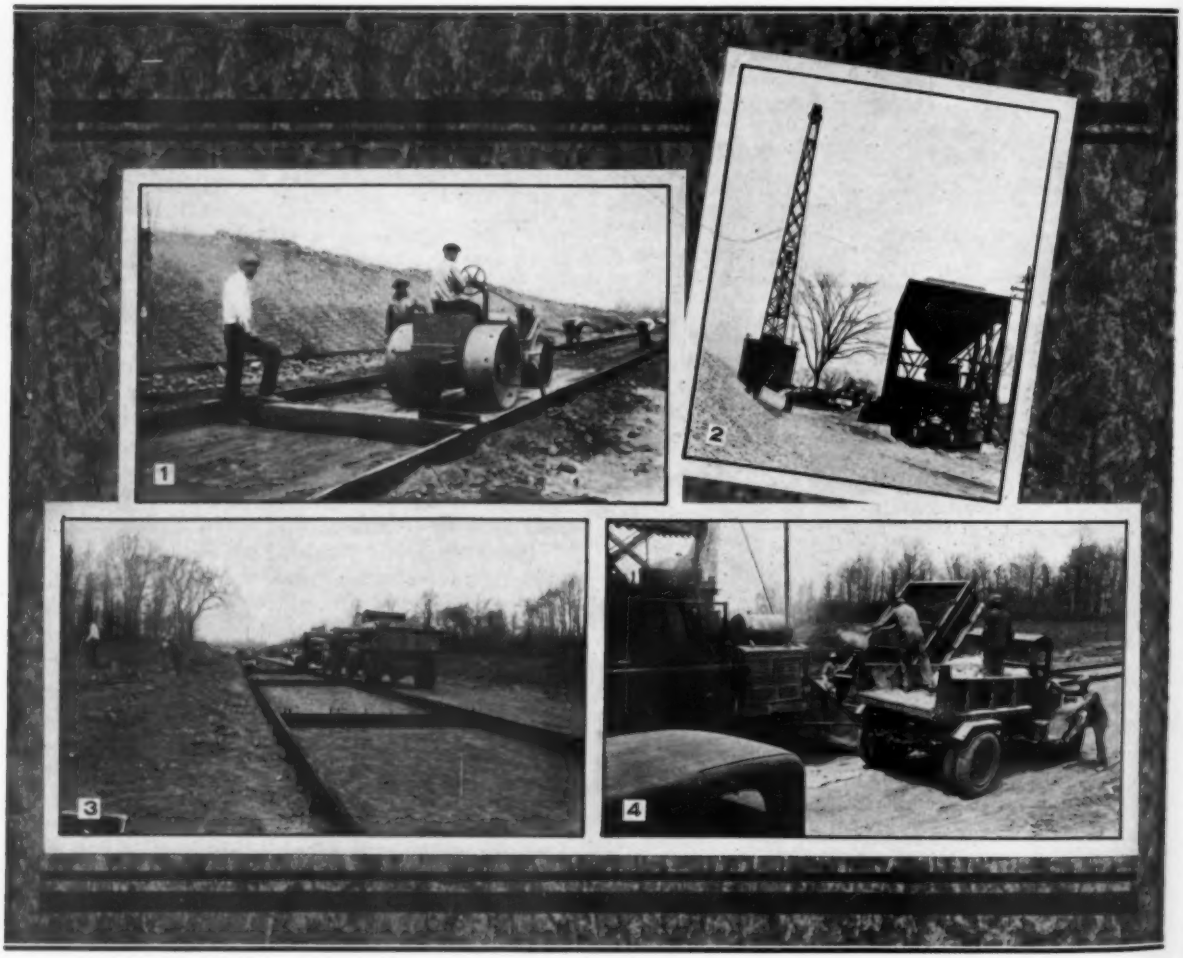
The project was constructed by S. J. Groves & Sons, Minneapolis, Minn., through the eastern division office at Ridgefield, N. J., with Walter D. Olsen as Superintendent. The work came under the direction of C. A. Burn, Division Construction Engineer, New Jersey State Highway Department with W. L. Braybrooke as Resident Engineer.

Accident Prevention and Costs

(*Continued from page 50*)

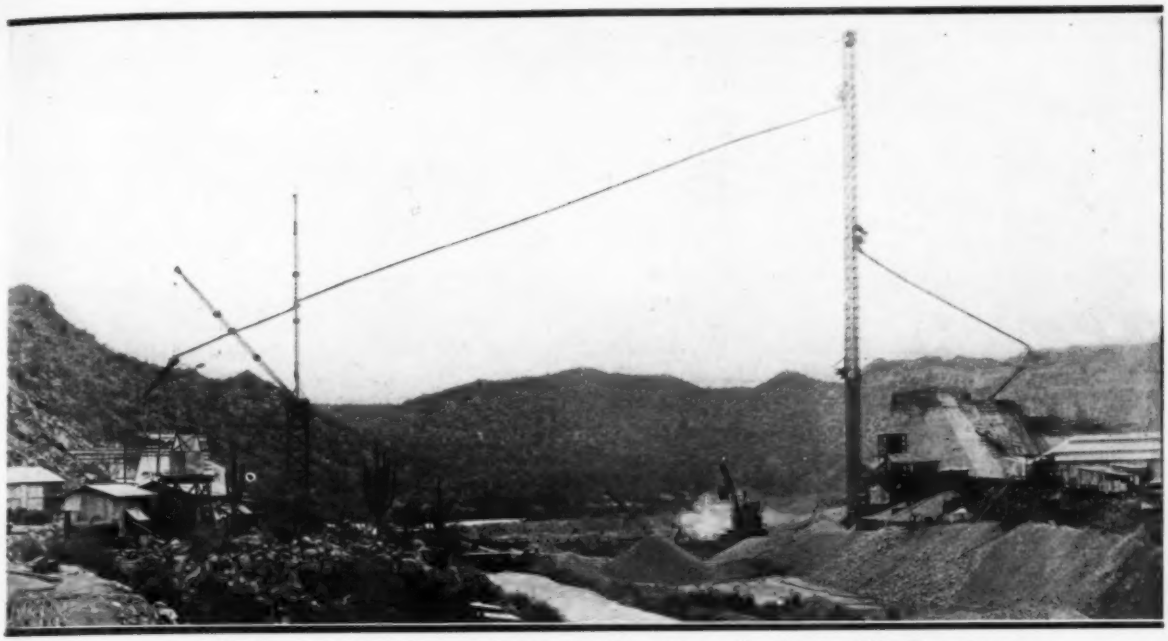
under the contractor and of every subcontractor as in safety work. It is just as much the duty of a man passing by to remove from the floor a plank with a nail sticking up in it as it is the duty of the man who left it there. It does not make any difference whether he left the plank there or the other fellow did. It must be removed and the men must be made to realize that it is their duty to remove every unsafe condition they observe, regardless of who was responsible for it.

There is no use temporizing about things of that kind. Drastic steps must be taken to impress upon the workmen the idea of accident prevention. The things that can be done to further this movement for safety are too numerous to mention but the one important and outstanding thing for everyone to do is to learn to think in terms of safety, both for himself and for others, and to keep this idea constantly in mind.



EQUIPMENT AND MATERIAL HANDLING ON THE S. J. GROVES & SONS JOB

1. A Wehr roller and scratch template on the subgrade. 2. The batching plant of the Gallo Sand & Gravel Co. at Netcong, N. J., 11 miles from the job, consisting of an Osgood crane with a Blaw-Knox bucket and an Erie AggreMeter plant. 3. Bulkheads and expansion joints with dowels set ahead of the paver and batch trucks waiting on the subgrade. 4. Tossing the cement bags into the skip from the shuttle truck



General View of the Dam Site and Construction Layout from One-Quarter Mile Downstream

Organization, Equipment *and* Methods

Building a Huge Irrigation and Power Project in Arizona

By

J. S. Connell

Assistant General Superintendent and Chief Engineer

Salt River Valley Water Users' Association

Phoenix, Ariz.

THE Stewart Mountain dam and power plant, on the Salt River irrigation project, in Arizona, completed March 8, 1930, is the final stage in a $11,000,000 power development program carried out in the last six years by the Salt River Valley Water Users' Association, the organization of 8,500 farmers operating the project. The entire program consisted of the construction of the Horse Mesa, Mormon Flat and Stewart Mountain dams and power plants on Salt River between Roosevelt storage dam and Granite Reef diversion dam, the increase in storage capacity at Roosevelt by installation of 15-foot gates in the spillways, increase in the generating capacity of the Roosevelt power plant from 14,000 to 24,000 horsepower, changing 165 miles of 45,000-volt transmission line to 110,000 volts and building 1,000 miles of transmission line for general service to farmers on the project, with necessary substations and other

DEEP FOUNDATION WORK BEING CARRIED ON INSIDE THE COFFERDAM

At left is the 120-foot Insley guy derrick with pile driver, just below which are the Kimball pumps and piping. At the right of the hole is the Lidgerwood electric dragline. Still further to the right are the Bucyrus and P. & H. draglines

installations. The generating capacity of the project power system was increased by this construction from 23,000 to 103,000 horsepower.

LOCATION

The Salt River project is located in south central Arizona. Phoenix, having a population of 70,400, is situated near the geographical center of the 340,000 acres directly or indirectly dependent on the project for irrigation water. Mesa, population 4,000, is the nearest railroad shipping point to the four dams, which are strung out along Salt River and create a continuous chain of lakes from Stewart Mountain dam, 40 miles from Phoenix, and 23 miles from Mesa, to the head of Roosevelt reservoir, a distance of 60 miles, interrupted only by the dams. The 23-mile trip from the Association's storage warehouse and yards at Mesa could be made in less than two hours by loaded trucks, partly over the famous Apache Trail.

NATURE OF THE WORK

The Stewart Mountain development consisted of the building of a composite arch and gravity dam and 17,500-horsepower power plant, with 12 miles of 45,000-volt transmission line from the substation at Granite Reef dam to the Stewart Mountain plant and 1,000 miles of retail distribution lines and appurtenances. The work was financed by a bond issue of $3,500,000, of which $2,300,000 was for the dam and power plant.

The dam consists of a central arched section of 486-foot span at the top, approximately the upper half of which thrusts against massive reinforced concrete abutments. The right abutment, looking downstream, is joined to the side of the canyon by a plain gravity section 115 feet long on top and the east abutment connects with the hillside by a gravity section 540 feet long, 270 feet of which is an ogee spillway closed by nine Taintor gates 27 feet wide and 23 feet high. The length of the arch on top is 530 feet and the center-line radius is 283 feet. For most of its height the curvature of the faces of the dam varies considerably from circular arcs, being curved most sharply at the base and being flattest at the top. The faces of the dam, therefore, are warped surfaces, and required differently shaped form work throughout. The arch has a minimum thickness at the top of 8 feet and at the base, 90 feet below stream bed, of 33 feet. The height of the dam above stream bed is 122 feet, the total height from deepest bed rock to top of coping being 212 feet. The arch section has a downstream inclination from the vertical which varies from a maximum of 10 feet overhang at the center to zero 70 feet from the abutments.

Four outlets are provided through the base of the dam, one 13½-foot, two 7-foot and one 8-foot penstock. The largest delivers water to the single 17,500-horsepower turbine. The power plant is located at the edge of the natural stream bed at the base of the arch on the west end. The downstream face of the dam forms the fourth side of the building.

The preliminary work required the construction of 16 miles of 30-foot road into the dam site from the main state highway between Phoenix, Roosevelt and Globe, including a bridge across the Salt River 3 miles below the dam. Power for construction was brought in over the permanent transmission line built to take the out-going current from the completed plant.

QUANTITIES

The main quantities involved were as follows:

Concrete	122,000 cubic yards
Cement	130,000 barrels
Steel piling	700,000 pounds
Reinforcing steel	1,090 tons
Lumber	2,150,000 board feet
Excavation, rock	31,000 cubic yards
Excavation, loose	103,000 cubic yards (not including the spillway channel which is to be sluiced)

PHYSICAL CONDITIONS

The canyon immediately at the dam site is fairly open, the width across the stream bed being 275 feet and at the top of the dam being 1,100 feet. Ample room was afforded for the camp site, plant layout and material storage. A great part of the material removed from the stream bed in building the cofferdam and excavating for the base of the dam was suitable for concrete aggregates and an ample supply of good gravel was readily accessible within less than 1,000 feet downstream from the dam. The foundation rock was hard gray granite of excellent character, although outside the stream bed the surface was more or less badly weathered, requiring removal for considerable depth to expose solid, firm rock. The character of the foundation is well illustrated by the results of grouting operations. A total of 95 holes were drilled for grouting, varying from 1-inch holes 100 feet deep made with diamond drills to 1½-inch holes 25 to 30 feet deep made with jack hammers. It was found possible to force a total of only 143 sacks of cement into all these holes, of which 25 went into a single hole, a seam or pocket evidently having been cut by the drill.

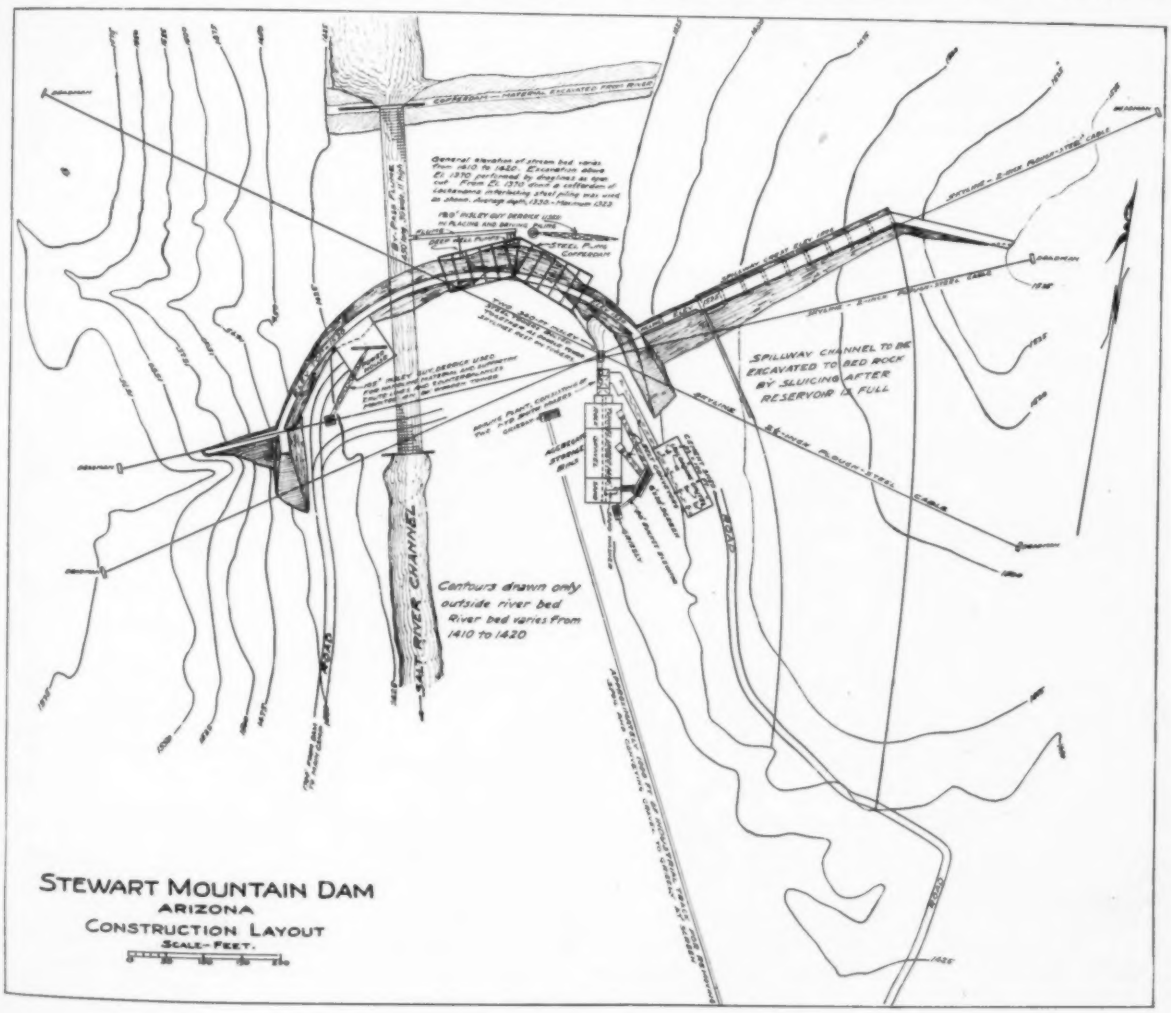
The existence of nearly 2,000,000 acre-feet storage immediately above in the Roosevelt, Horse Mesa and Mormon Flat reservoirs, gave assurance of freedom from flood damage. It was also possible, when required by the exigencies of construction, to shut off the river flow at Mormon Flat dam, 10 miles above, and thus dry up all but seepage water at the Stewart Mountain site, a considerable advantage in foundation work.

The road location and construction presented no difficulties, grades and curvature being negligible. Only a small percentage required surfacing, as the natural material comprising the road grade contained disintegrated granite in excellent proportion for surfacing.

The climate is subtropical and affords ideal living and construction conditions. The mild winter eliminates difficulties from frost and the summer, while hot, is dry and not uncomfortable so that work proceeded at full efficiency.

THE CONSTRUCTION CAMP

The main camp consisted of the mess house, time



office, first aid station, store room, bath house and 43 six-man bunk houses. Besides this group, which was located approximately 1,700 feet from the dam, there were three other groups housing members of the force with families, one being occupied by white men, one by Mexicans and the other by Indians. Quite a number of Apache Indian workmen were employed, giving excellent service. The use of bunk houses in small units was found a decided advantage over larger houses, since it made possible the separate housing of day and night shifts and provided efficient segregation in the event of necessity for medical reasons. A qualified interne was maintained at the camp throughout the work, with consequent increased efficiency, decrease in time lost by workmen, and greatly decreased hospital costs. Not a single casualty or serious injury occurred on construction.

PLANT LAYOUT AND OPERATION

The road work was performed by two Caterpillar Sixty tractors, pulling plows and graders. Surfacing and maintenance was handled by an Adams road grader.

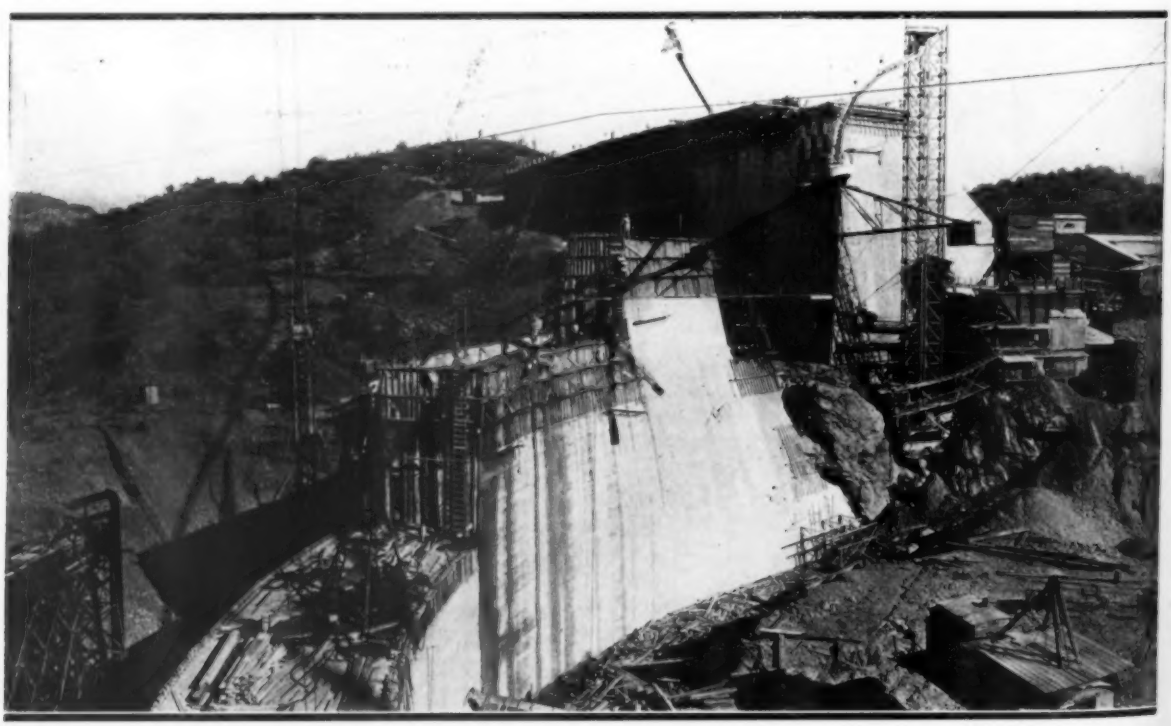
Excavation for foundations, building of diversion dyke or cofferdam, digging gravel for concrete aggregates and handling it from dump piles to grizzlies was performed by five draglines, one of them being used at times also as a shovel. These machines were two 3-yard Bucyrus gasoline draglines purchased from the U. S. Bureau of Reclamation, the 60-foot boom of one being extended to 82 feet and equipped with a 2-yard bucket; one 2-yard Lidgerwood electric dragline; one ¾-yard P. & H. dragline; and one 1-yard P. & H. dragline which was also used as a shovel.

Close-up material was handled directly by the Bucyrus draglines. Gravel from distances too great to be handled in this way was loaded by the machines into steel side-dump cars operated by cables and hoists and running on industrial tracks leading to the grizzly at the screen. Approximately 3,000 feet of such tracks were used in all. Excavation for foundation was made to a depth of 40 feet from the stream bed as an open cut. Below that level material was removed inside a cofferdam made by driving two parallel rows of Lackawanna interlocking steel piling 47 feet apart, the depth averaging 40 feet below the open cut. A 220-foot Insley steel guy derrick and a McKiernan-Terry No. 7 reversible double-acting hammer, operated with compressed air using 350 cubic feet of air a minute at a pressure of 90 pounds per square inch and delivering 225 strokes per minute, were used in setting and driving the piling.

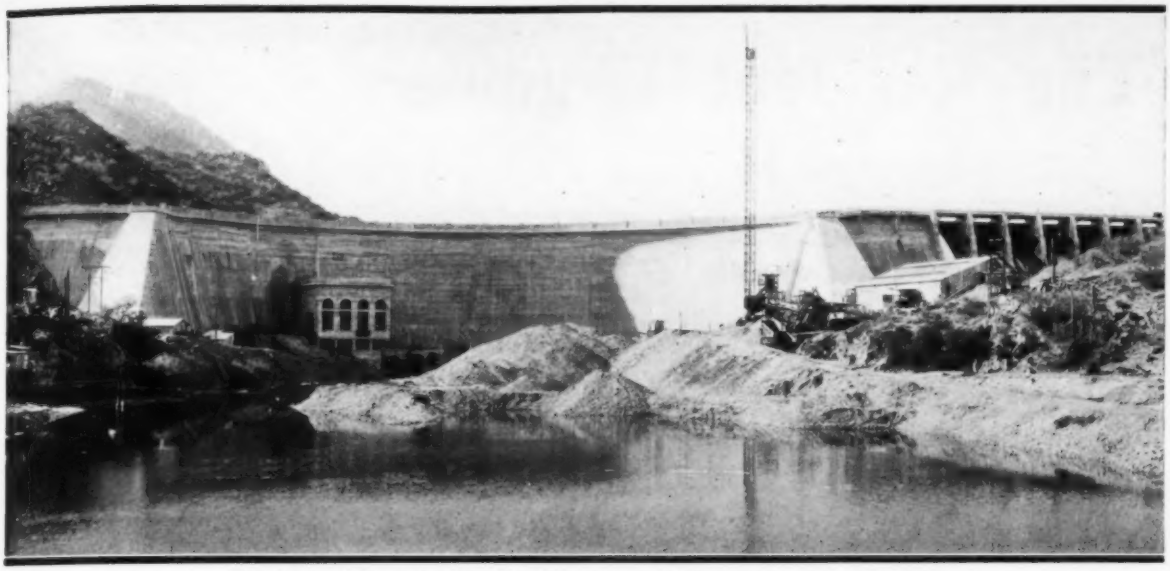
Water as released from Mormon Flat reservoir for irrigation was by-passed by a timber flume, 450 feet long, 30 feet wide and 11 feet deep. This also provided capacity for any flash run-off below Mormon Flat. Seepage in the deep excavation was handled by five 18-inch Kimball deep well screw pumps with 150-horsepower motors.

SCREENING, STORING AND MIXING PLANT

The gravel as excavated from the stream bed was deposited by a dragline on a grizzly and from this it was lifted by a 40-foot bucket elevator to a 6 x 30-foot revolving screen. A storage bin 120 feet long and approximately 45 feet wide and 20 feet deep divided into compartments of 1,000, 2,000 and 1,000 cubic yards for sand, gravel and stone, respectively, received the screened aggregates. One side of the bin was



Panorama Showing the Arch Sections Well Above the Stream Bed



The Stewart Mountain Dam Showing Progress of Construction in April, 1930

formed by the back of a low rock bluff. Sand from the screen was discharged directly through a wooden chute to the washer, over the bin, and gravel and rock were carried by 24-inch belt conveyors to their compartments. A tunnel was built along the bottom of the storage bin to a 45-foot bucket elevator which raised the aggregates from a 24-inch belt conveyor in the tunnel to the bins over the mixers. The capacity of these bins was 30 yards each for sand and rock and 60 yards for gravel. A 16-inch belt conveyor brought cement from the storage shed. This shed was 36 x 100 feet and was built on the side of the bluff, with a terraced floor. Cement trucks unloaded directly to the upper ends of four stationary chutes which enabled the sacks to be deposited by gravity at any level in the shed.

The main mixing plant consisted of two 1-yard Smith mixers, one discharging directly toward the chuting towers and the other discharging in the opposite direction into a second chute directly under the first, the chutes from both mixers leading directly to the tower skips. A Blaw-Knox inundator was used. Two 340-foot Insley steel towers, bolted together as a double tower, elevated the concrete to 20-inch chute lines, suspended from three plough-steel skylines, one being 2½ inches in diameter and 1,500 feet long, one 2 inches in diameter and 1,600 feet long and one 2 inches in diameter and 1,300 feet long. They were anchored at each end to deadmen and were supported near the middle by the towers. At the west end of the arch a 105-foot Insley steel guy derrick was mounted on an 80-foot wood tower and served to handle material and the chute lines. This derrick, with four 40-foot counterbalances, enabled concrete to be chuted to any part of the work. The plant had a capacity of 1,000 cubic yards per day of two 8-hour shifts. A ½-yard Smith mixer was used on the work for small isolated odd jobs.

Other Equipment

Miscellaneous equipment not described in the above included the following: three 1-inch cableways, parallel to the skylines, for raising chutes, picking up and moving equipment and material; three 11 x 12-inch frame American hoists with separate slewing engines; two cableway hoists and other miscellaneous hoists; Ransome pneumatic grout-placing machines; Leynor X-70 drifters for 30-foot grout holes; one 12 x 16-inch Blake jaw crusher; one complete machine shop and boiler shop; miscellaneous pumps for mixer supply, cooling, etc.; and miscellaneous electric motors, transformers and other electrical equipment. Except as otherwise stated, all equipment was electrically-operated. A fleet of ten 5-ton trucks was used for hauling cement and other material from Mesa.

Foundation Excavation

The foundation excavation 90 feet below stream bed was the outstanding feature of the work at the dam. The piling was aligned and held by heavy timber waling supported by trusses across the 47-foot span, the interval between trusses being 17½ feet. Great care was taken to stop driving when any pile encountered a boulder and not to attempt to push the pile or piles deeper until the excavation inside the cofferdam had exposed the rock and permitted its removal. By this means a perfectly aligned and watertight job was secured. The space enclosed by piling was 210 feet long, 47 feet wide and averaged 40 feet in depth. Sufficient room was allowed between the inside of the piling and the face of the dam to permit forming the concrete from bed rock up. When no longer needed, the piling was pulled by the hammer. Part was used for reinforcing around the penstocks and part was returned to stock and resold.

Construction Forces

All work was done by forces of the Salt River Valley Water Users' Association, practically the same personnel and much of the same equipment being employed as on the Horse Mesa and Stewart Mountain construction. As a result of the existence of this organization

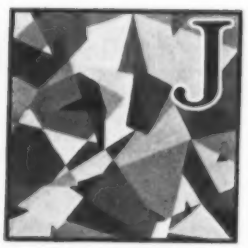
(*Continued on page 60*)

The Resident Engineer

Takes a Lesson from

The Grade Foreman

A True Tale Retold by the Resident Engineer Who Appreciated the Lesson



IM was a first rate foreman of a grade shovel gang. He knew his job, took pride in his work and did it well. But he well knew the weakness of the Resident Engineer for fault finding as a means of showing his authority, and so rather than have trouble that would cost his boss money he would deliberately leave the ditches 3 or 4 inches high or not complete some other piece of work so that when the Resident Engineer came along to inspect the work he would have something to rave about. There would be considerable strong language in the part of the Resident Engineer and the Grade Foreman would learn for the ten-thousandth time how rotten a grade foreman he was. Then, complacently, Jim would go back and complete the job as he would have liked to have done it originally, but, had he done it that way in the first place, some change would have been necessary to satisfy the Resident Engineer and that would have cost money.

One Saturday morning the Resident Engineer was coming along the grade and saw the Grade Foreman ahead. He noted that the ditches were not neat and also that the Grade Foreman had a small boy along with him. The Resident Engineer called to the Grade Foreman.

"You're one h - - l of a grade man to let those d - - - d ditches look like that. Get busy with that d - - - d gang of yours and make them deeper. What the h - - l do you think you can get away with around here?"

The tirade was interrupted by the Grade Foreman stepping up to the Resident Engineer and saying:

"Stop that, this boy is my son and I won't have anybody talking to me like that when he is around. That boy thinks I am the best grade foreman in the world and also a real man. It is his ambition to be as good a foreman when he grows up. If you have any talk like that to hand out save it until Monday when he will be in school."

The Resident Engineer was quite taken off his guard. He was not used to being talked to like that, and furthermore he was the father of four strapping boys who thought he was the biggest and best road engineer in the world. He walked away and went to the nearest phone, called the Superintendent and asked him how soon he could see him. The Superintendent, surprised by the rather stirred voice of the Resident Engineer, inquired what was wrong.

"Not a thing but I want to see you just as soon as I can. I'll come right up to your office. So long, see you in a few minutes."

Ten minutes later the Resident Engineer burst into the Superintendent's office and related the story as told above and continued:

"I know that Grade Foreman and I know that he knows his job, and I know that he leaves the ditches high so I can exercise my lungs telling him about them and he knows that I expect him to do just that. But, when he called me for talking as I did before his boy he caught me right and I learned a lesson in the duties of fatherhood not only as regards my responsibility to my own boys but to others."

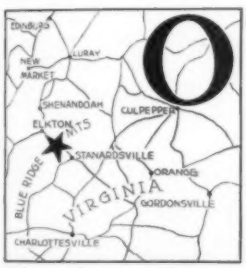
Organization, Equipment and Methods

(Continued from page 59)

and equipment, together with the fact that no additional expenditure was necessary for overhead, warehouse storage yards, machine shop and other mechanical equipment, contract work was not considered. It is estimated that a saving of 25 per cent was made over contract prices under these unusual and exceptional conditions. The entire job was completed in one year, five months and eight days from the day the bond money became available.

Blue Ridge Mountains of Virginia Scene of Heavy Grading Contract

Pace Construction Co. of Roanoke, Va., Tackled 2.489-Mile Job from Bottom to Top of Mountain



ON slopes so steep that tractors and shovels could not operate in the winter weather when the job was opened and men could scarcely stand, the Pace Construction Co., Roanoke, Va., tackled a heavy grading project on Virginia State Highway No. 17, in the heart of the famous Blue Ridge Mountains, starting at the Green County line and extending about 2.5 miles toward Elkton. The low bidder on the job quit after looking the site over a second time and, Pace being the second low, received the contract.

Work Started Under Difficulties

The new line is over steep country and cuts about one-half mile from the length of the present highway which is narrow and very winding. One shovel was started about one-third of the way from the lower end of the job where the old and new lines coincide for a short distance. That was an easy matter as the shovel simply cut the new line and cast most of the material over to form fills up to 75 feet deep.

Starting the upper end was not so easy. In order to make the work of the shovel efficient it was necessary for the shovel to work uphill so that the material could be hauled down grade. On February 3, 1930, when the work was started at the upper end, the mountain was coated with ice and snow but the shovel was worked in

SCENES ON THE PAGE CONSTRUCTION CO. JOB IN THE BLUE RIDGE MOUNTAINS

1. *Dumping on a 35-foot fill.* 2. *A stretch of 1½ miles of completed grading, showing the scenic beauty of the road.* 3. *Another view of the Shenandoah Valley from the job*

on the existing road, then cut a bench on the new line to a point about 1 mile from the upper end and then turned and worked back upgrade. Because of the large amount of hard rock handled by the shovels all three were equipped with manganese teeth.

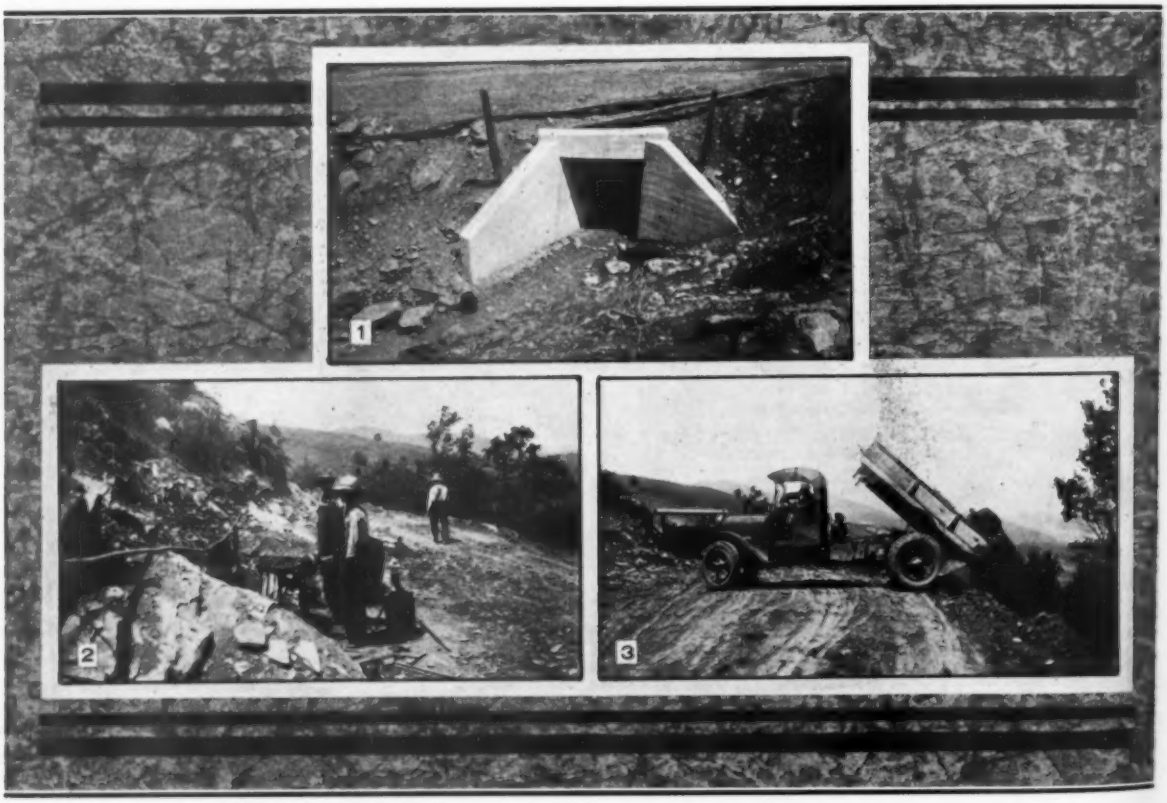
At the lower end where the third of the Erie steam shovels started work the two rights of way were the same and separate in alternate stretches of about 300 feet. This made it difficult to maintain traffic but every effort was put forth not to inconvenience the fairly heavy traffic that uses this important connecting link between the Shenandoah Valley and the eastern section of the state. On this stretch trucks were used and loaded by the shovel and backed about 250 to 300 feet to the fills which ran as high as 35 feet and dumped as shown in the photographs. On the upper section the contractor used his 2-yard Watson dump wagons with three mules to the hitch. A total of 21 mules were kept on the job and well cared for. The working hours of the shovels running with trucks were from 6.30 A. M. to 6 P. M. with one-half hour for lunch while the shovels operating with the mules on the dump wagons started at the same hour and quit a half hour later because the stock required a full hour at noon to feed and water. Toward the end of the job the contractor cut the working time to ten hours as he found that the crews were not producing any more in eleven hours than they had in ten. This is an interesting commentary on the fact that machines can work on and on without showing fatigue beyond the usual wearing out of any piece of equipment no matter how well maintained, but the human machine will not stand the gaff beyond a certain number of hours a day and in this work it was definitely shown to be ten hours.

40 Per Cent of Excavation Cast Over

The total excavation for the contract was 81,000 yards of which 5,000 yards were wasted evenly along the section where the cut was in excess and about 30,000 yards or 40 per cent of the cut was cast over without loading into wagons or trucks. Where the earth and rock were loaded the maximum haul was about 600 feet with the average about 300 feet. The design of the grade by the State engineers balanced the cut and fill quite well except where there were excessive cuts necessitating wasting.

All fills were rolled in 12-inch layers with one of the two Austin 10-ton steam rollers where possible. On some of the deeper fills it was impossible to put on the rollers until part of the fill had been put in. A Caterpillar Thirty with a LaPlant-Choate hydraulic bulldozer speeded up the handling of the fill where the heavy trucks and dump wagons were used as in many cases the tractor pushed the load dumped over the edge in time for the truck or wagon to run back over the place where it had dumped. An Austin Junior Rip-snorter blade grader was used with the tractor to dress the work to the finished grade.

The contract date of completion of the job was June 1, 1930, but this was extended a few days as some of



DRAINAGE, CUT AND FILL ON A BLUE RIDGE JOB

1. A cattle pass and culvert 6 feet high, 4 feet wide and 105 feet long. 2. The outdoor blacksmith shop kept close to the drilling. No frills but plenty of sharp steel always ready. 3. A Mack truck dumping over the edge of a high side hill fill

the quantities in the original contract were increased. The work was completed within the extended time including the dressing of the shoulders.

The bombardment of 2-yard boulders nearly wrecked the pump supplying one of the steam shovels from a stream about 200 feet below in the valley. Two Barnes pumps and one Domestic were used to supply the steam shovels. At one end where the lift was too great one pump delivered the water to a tank from which the second pump boosted it to the shovels higher up.

DRILLING AND SHOOTING

Two Ingersoll-Rand portable air compressors and one Schramm portable were used to supply air to the four Ingersoll-Rand jackhammers. The contractor tried out one of the new high-speed I-R jackhammers and was pleased with the results. In addition he had a supply of detachable bits made by the Detachable Bit Co., New York. These consist of a single steel shank with a collar and detachable bits of various diameters which are screwed into the collar and removed and thrown away when dull. As the cost is moderate it saves the expense of a blacksmith.

Two outdoor blacksmith shops were maintained, one at each drilling location to keep the drillers supplied. If the steel had been sharpened at the camps it would have necessitated a much larger amount of steel because of the long and difficult haul.

Some of the holes were run as deep as 14 feet and then loaded with 40 per cent DuPont or Union dynamite. A total of 4 tons of these explosives was used on the job and in addition 400 kegs of black powder for springing the shale and loose rock to speed up the output of the shovels in hard going. In some of the cuts where boulder formation was encountered the black powder was used. Mud capping was resorted to at times but as it is wasteful of the explosive it was done only in emergencies.

DRAINAGE STRUCTURES

Drainage on the project was provided by two box culverts and about 3,000 feet of 15, 18 and 24-inch corrugated metal pipe. The culverts measured 3 x 3 feet by 90 feet long and 4 x 6 feet by 105 feet long. The latter was a combined culvert and cattle pass as the new right of way cut a large pasturage in two and prevented the cattle from reaching water at the lower end. As one-way traffic will be the rule in the cattle pass it will be interesting to learn the solution of the problem by these lower animals.

LABOR CAMPS

Inasmuch as both white and colored labor were employed two construction camps were maintained. The white labor camp was at the foot of the mountain near Swift Run post office and the colored camp at the top of the mountain near Fern Hill post office. A total of 60 men was employed regularly on the project including shovel operators, tractor operators, foremen and laborers.

PERSONNEL

The work was under the personal charge of Gordon B. Pace, President, Pace Construction Co., Roanoke, Va., with J. R. Vaughan as Superintendent. For the Virginia Department of Highways, E. C. Ramsey was Inspector and J. B. Trimble was Resident Engineer.

Drainage Outlet Control Built on Unstable Foundation

(*Continued from page 52*)

PROVISIONS FOR BACK FLOW

There are times during late summer when it is necessary to allow the tide to flow into the ditch to furnish water for stock, so it was necessary to make provisions for opening the gates. This was done by driving a line of piling 12 feet out from the gate on which a cap and small winches to operate the gate lift chains are placed.

Due to the suitability of the construction chosen to the conditions at hand both the time and cost of the installation were greatly reduced. Comparison of the cost of making the installation with the estimated cost of alternative types of similar capacity, show that the cost of the construction used was only 39 per cent of that of a built-in-place construction and 56 per cent of that estimated for a timber structure.

PERSONNEL

The work was done under the joint direction of Mr. Stockoff, President of the Fat Elk Creek Drainage District, and H. E. Newell, Engineer of the Pure Iron Culvert & Mfg. Co., Portland, Ore.

Breakdowns Are Costly

THE scene was the north central section of South Carolina, the day perfect for paving, the subgrade dry and a bit dusty, but that is a far happier condition than a wet subgrade on which the trucks skid and mire. As one approached the job a long line of trucks were seen backed up toward the paver, but there seemed to be little action about the paver. A car started to rush past, when it was stopped quickly, and the driver asked if he could be of service. We stated our errand, and he said, "Sorry, the main drive shaft on the paver has snapped and the nearest repair is 72 miles away. I think I can drive over there, get the new shaft, and get back in time to put it in and work long enough before dark to empty the 25 trucks that are in line out there on the grade. We stopped the other ten before they were loaded at the batcher plant."

That is the sad story of a breakdown on the road when the pouring must be stopped for an accident to an important machine. It costs money to have breakdowns, more effective lubrication and greater care in inspection of the paver might have caught the prospective break and made it possible to have the repair part ready when the failure actually came.

A Long Line of 25 Batch Trucks Awaiting the Repair of the Paver and Repair Parts 72 Miles Away

Handling Concrete for Paving with Tractors

Central Proportioning Plant Served by Tractors and Trailers with Special Batch Boxes and Industrial Railway

AN efficient material handling system for concrete road work has been developed by the R. D. Baker Co., Royal Oak, Mich., in which a fleet of 22 industrial tractors are used to haul the batches from central proportioning plants. Much of the work performed by this company is in the vicinity of Detroit, where the demand for hard-surfaced highways is ever on the increase. The low cost of operation made possible by well-equipped central proportioning plants and the quick transportation of large quantities of materials in special batch boxes by means of tractors and trailers, has enabled the R. D. Baker Co., to bid succcessfully for much of the paving work in this territory.

The Central Proportioning Plant

With central proportioning plants as utilized by this contractor, the large quantities of materials required on a big contract can frequently be accumulated in conveniently located stock piles near a railroad siding. Unloading materials from railroad cars direct to stock piles eliminates demurrage charges. By means of these central plants, material wastes are greatly reduced. Damage to subgrade by dumping aggregates thereon is eliminated. Outstanding savings in time and labor are possible. Finally, the cost of transporting the materials to the job in boxes containing the proportioned batches has been reduced to a minimum by the use of tractors pulling the trailers.

Eight batch boxes are conveyed on each trip with four on a semi-trailer and four on a 4-wheel trailer, as shown in the accompanying illustration. The trailers are made by the Winsor Tractor Equipment Corp., Ann Arbor, Mich. Each batch box has a capacity of 42 cubic feet, although only 33 cubic feet of material are usually carried in each box. The boxes are filled at the central proportioning plant by means of overhead volumetric batchers served by bin loaded by the cranes. The materials are delivered in proper proportion to each box for the batch. Better and more quiet transportation service has been obtained by equipping the rear wheels of the 22 McCormick-Deering tractors with 42 x 9 pneumatic tires inflated to a pressure of 50 pounds.

Delivery to Industrial Railway

From the central proportioning plant the batch boxes are speeded to the vicinity of the paving work, where a crane lifts the boxes from the trailers and places them on industrial railway cars, on which they are transported directly to the mixer. On a recent job on Division road, the average distance the batch boxes were hauled by the tractor was 3.6 miles, and each trailer outfit delivered a load of boxes at intervals of about one hour.

Stock Piling for Future Contracts

Recently the R. D. Baker Co., has been using these

tractors and trailer outfits for the transport of gravel which is stored for future contracts. The gravel is loaded into the same boxes that are used for carrying concrete batches, and eight batches are similarly loaded on the two trailers. Eleven yards of gravel are hauled on each trip, a distance of 13 miles, and each outfit has been making four round trips a day, or a total of 104 miles. The round trip required about 2 hours and 10 minutes. The cost of hauling this gravel, including interest, depreciation and all operating expenses, is 3.8 cents per yard per mile. This is an unusually low figure considering the fact that no load is hauled on the return trip.

SHIFTING INDUSTRIAL TRACK

One of the industrial tractors used by the contractor is equipped with a Winsor power-operated boom, and an important labor-saving job performed by this outfit and semi-trailer is the quick transfer of industrial railway track sections from one place to another. Before the acquisition of this outfit it was difficult work to load and unload these track sections by hand. Each section is 15 feet long and weighs about 250 pounds. The boom easily lifts two of the sections at a time, and quickly places them on the trailer or removes them as the case may be. In this single important operation, which must be frequently repeated in the course of a season, a great deal of time and labor is saved.

STORAGE YARD

The Baker Co., maintains a large storage yard, garage and service plant at Royal Oak, and the tractors are frequently used also in the yard to move heavy equipment, switch cars and transport sand and gravel. Hoppers are located in this yard from which batches have been transferred to numerous jobs in Royal Oak and vicinity. On the more distant work, however, other supply bases with their measuring hoppers, cranes, etc., located near railroad sidings, are utilized.

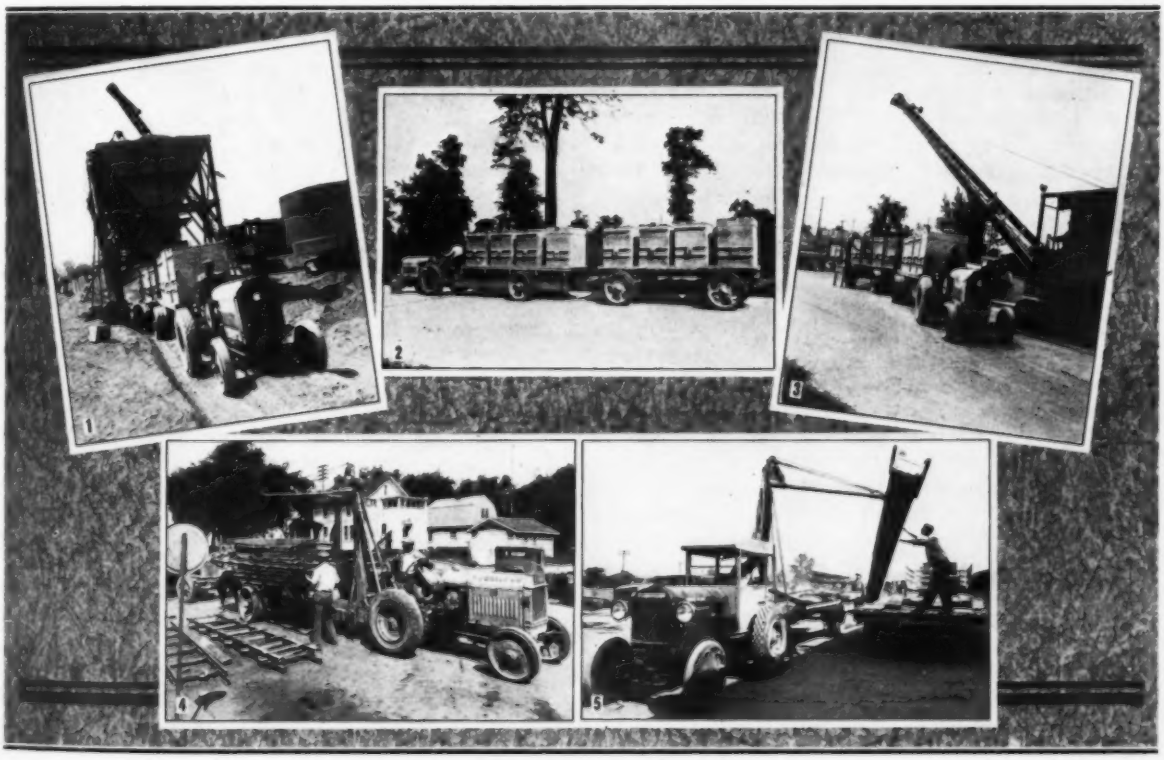
PERSONNEL

R. D. Baker, President, R. D. Baker Co., Royal Oak, Mich., has been engaged in road building for the past 25 years, and the organization is now one of the largest concerns of its type in Michigan. W. M. Stange is Vice-President, and W. R. Elcock is Secretary.

Dallas, Texas, to Have Tallest Welded Building

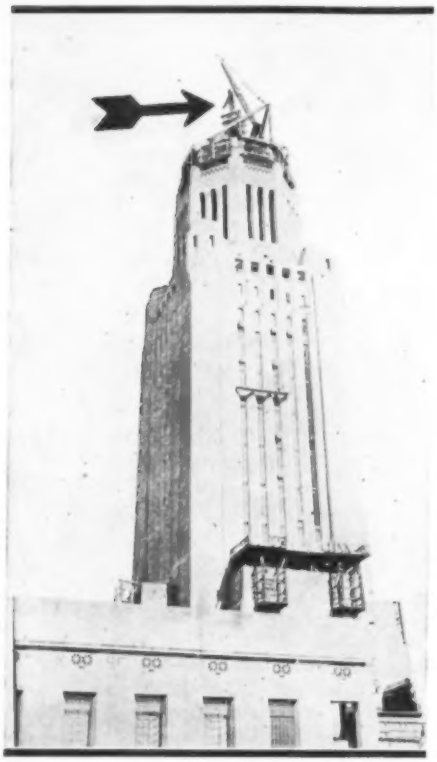
A 100 per cent electrically welded building 19 stories high, the tallest yet undertaken, is now being erected in Dallas, Texas, as an office building for the Dallas Power & Light Co.

Construction began March 15, excavation and footings have been completed, and the first steel was on the job on July 1. The steel fabrication and erection is being done by the Mosher Steel & Machinery Co. with General Electric welding equipment. Lang & Witchell are the architects, R. L. Rolfe is structural engineer for the building, and Frank P. McKibben has been retained as consulting engineer in connection with the welding.



HANDLING BATCHES AND HEAVY MATERIALS WITH TRACTOR AND TRAILER UNITS

1. Loading the batch boxes on a semi-trailer and trailer hauled by a rubber-tired McCormick-Deering tractor. 2. A tractor-trailer unit with 8 batch boxes on the road. 3. Transferring the batch boxes from the trailers to the industrial railway for delivery to the paver. 4. Handling industrial railway track with a tractor and trailer equipped with a Winsor boom. 5. The Winsor 1-ton crane doing a heavy lift at the storage yard



Block *and* Tackle Puts Modern Giant *in* His Place

By
A. O. Wiggenjost

PUTTING a 35-foot giant in his place presents to modern man no problems which cannot be solved with modern equipment. The design for the new State Capitol in Lincoln, Nebr., included a statue, "The Sower," for the tower which is now being completed. This structure, which rises to a height of 400 feet, and the construction of which has been going on for nearly ten years at a cost of $10,000,000, has been given considerable favorable attention because of its unusual design and beauty. The tower, upon which this giant has now been placed, is the latest unit to be constructed, and Peter Kiewit's Sons, Omaha, Nebr., contractors for this section, expect that it will be completed by fall.

Work on the Tower

The most interesting and perhaps one of the most precarious undertakings in connection with this work has been the erection on the tower of a huge 35-foot, overall dimensions with base, bronze statue typifying "The Sower." This statute designed by Lee Laurie, well-known sculptor, was constructed and erected by the General Bronze Co., Long Island City, New York. It weighs 10 tons with the base parts complete and has about a ton of lead in the lower extremities of the legs to act as a counterweight for the lower part of the statue.

Placing the Sower

Coming shipped in a reclining position in an open steel railway car the figure was semi-crated. Steel wire rope slings were placed under the arms, run upward behind the shoulders with blocks of wood under the various parts of the cable under heaviest strain. From the upper hooking on point with the tackle block down to each foot and leg, were run two four strand rope tackles. As the statue was raised "ladylike" the two rope tackles were eased off simultaneously until the statue assumed a vertical position. At this point a brief delay occurred up on the tower when a cable slipped slightly off a drum and the crowd of several thousand people who watched the proceedings grew somewhat apprehensive.

However the delay was short and the statue left the ground within a few minutes. After reaching the top of the tower it was placed temporarily in what might be called a pit inside the tower. This is where the water supply tanks and equipment are arranged and it was there that the statue remained for several days. After the boom was ducked to its inside quarter, preparations were made and another perfect day with little wind eagerly awaited by the iron workers.

The length of the 20-ton boom was 70 feet and, as previous calculations showed that surplus drift was at a premium, the hook was removed from the tackle block at the last minute and a close hitch made directly to the lower part of the tackle block. This gave some additional working cable which was much needed as one of the sections of the base part was now to be bolted on the statue to go up with it and then dropped down over and around the pillar.

This main supporting pillar was built up of four vertical 4 x 4-inch angle beams with 6 x ⅜-inch cross pieces every 2 feet. This square open center pillar was next strengthened by placing on each of its four sides vertically two 5 x 5-inch channels, their edges next to the center square pillar. This gave a total of eight vertical 5 x 5-inch channel beams besides the four angle beams. Horizontal cross pieces were bolted on the pairs of channels and the whole gave a very rigid support.

A temporary wood scaffold was in place around the pedestal for the steel men to work from in placing bolts through the base plates.

The statue is in one piece but the base is composed of sections that fit snugly around the vertical center support beams while the "Sower" itself is represented to stand on a shock of grain and of corn, the mounting of which also was handled in sections and bolted around the center beams.

The steel base plate of the statue and the corresponding base plate of the pedestal are about 3 feet in diameter. Twenty-eight holes around its outer edge provide ample bolting strength with ¾ x 3-inch bolts and the all around designing is provided for withstanding a hurricane wind of at least 140 miles per hour. The statue faces northwest in the direction of the prevailing winds.

Steel bracings of 5 x 1¼-inch solid steel bars inside the statue otherwise hollow, provide additional strength for body, arms and legs. A dome like portion of the base part between the feet had deeply grooved in its surface a directional compass while a plumb bob suspended from beneath the statue's crotch of his legs checked the vertical balance with the intersection of the compass lines.

After removing the harness of wire rope a coat of liquid bees wax was given the "Sower" to keep its good looks intact as long as possible. This was accomplished by placing a man in a rope chair and suspending him from the boom at various positions to do the work.

It might be mentioned that all the signals to the engineer were made by telephone, his position in a pit making it impossible for him to see proceedings. It was also especially noteworthy that the cooperation between all members of the crew was almost phenomenal. At times for instance during operations there would be a long period of inactivity, then suddenly an emergency would arise, deft movements were made by workmen, someone would pick up the telephone and speak quickly "Top up," almost instantaneously in most cases after these long waits the boom would respond and then equally alert go through other motions as occasion demanded.

The photograph shown of the head and shoulders of the "Sower" was taken by the writer from the upper part of the boom shown by the arrow on the photograph of the tower.

PERSONNEL

Louis D. Bauman was the erection Superintendent for the General Bronze Corp., Long Island City, N. Y.

J. S. Manion is Construction Engineer for the State of Nebraska and was Inspector for this work.

Bertram Goodhue Associates, Architects of New York City, are the architects for the building that when finally completed will no doubt be one of the finest structures of its kind in this country.

The Sower—A Bronze Gulliver as He Appeared While Being Lifted to His Lofty Perch

Practical First Aid

By John Russell, Jr.

Editor, Construction News Letter, National Safety Council

IT is one of my pleasant duties to teach the construction force first aid. It is not the kind where a man must tote pharmacy. How to use an iodine swab, what pieces of clothing may be used as bandages and the immediate steps to be taken until the man from the first aid room can get to the site are taught.

During the first part of 1928 some 2,000 or about 65 per cent of the employees of a California petroleum company were given the regular United States Bureau of Mines course in first aid to the injured. This training, along with some other minor educational work has shown some very interesting results. The company's annual report shows a 39.7 per cent reduction in the number of lost-time accidents, 44.6 per cent reduction in number of days lost time and 26.2 per cent reduction in compensation and medical costs. The company feels that the larger percentage of the above reductions is a direct result of first aid training.

Accidents often occur in unexpected places. If they are serious, it is a Godsend to the injured person to have someone immediately available who can administer first aid treatment completely. This brief statement shows that in order to always have someone available at the time of an accident who knows first aid methods it is necessary for everyone to have a knowledge of this important work. This is not wholly practicable so the next best thing is for us to impart the knowledge to as many as possible.

First aid training not only provides for the emergency treatment of accidental injuries, it also contributes in a large measure to their prevention as follows:

1. It makes a man think about himself in terms of the physically handicapped man.
2. It makes a man actually think of the cost of an accident in physical pain to himself.
3. It stimulates thinking in terms of safety.
4. It gives him a better understanding of the human body.

Strength of Materials

AN elementary and an advanced volume on the strength of materials have recently been published under the authorship of S. Timoshenko, Professor of Engineering Mechanics, University of Michigan.

The first volume which is elementary, deals with the theory and problems. The text is written on the idea that design is no longer based principally on empirical formulas. It shows the importance of analytical methods combined with laboratory experiments in the solution of technical problems, a method which is becoming more generally accepted. It is the aim of the book to present problems such that the student's attention will be focussed on the practical application of the subject.

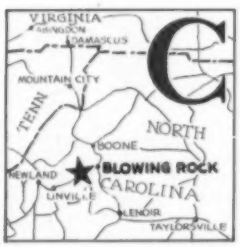
The second volume was written principally for advanced students, research engineers and designers and contains new developments which are of practical importance in the fields of strength of materials and theory of elasticity.

These books are published by D. Van Nostrand Co., Inc., New York. Volume I, price $3.50 and Volume II, price $4.50.

Portable Crushers *and* Convict Labor *on a* North Carolina Mountain Road

Nello L. Teer,
Durham, N. C.

Opened Five Quarries and Crushed Stone on the Subgrade on 11-Mile Job in Watauga and Caldwell Counties in Rough Country



CONVICT labor at 25 cents an hour proved successful on the 11-mile gravel road job which Nello L. Teer of Durham, N. C., started in August, 1929, and completed in one year. The grading had been completed under another contract, the surfacing job calling for a 6-inch base of hand napped rock, and a top of crusher run stone up to 3 inches in diameter laid 5 inches deep. This was left loose and the bituminous treatment with tar completed by the State as fast as sections from the easterly end at Blowing Rock were completed.

Gravel Surface Used at Easterly End

Gravel from a river bed was loaded onto 22 hired dump trucks for the easterly section by a Universal ½-yard shovel and hauled varying distances up to 2 miles and dumped on the subgrade. A gang of 11 negro convicts under guard spread the material with 3-pronged rakes removing the oversize stone for later crushing for the top. The oversize was cast to the side of the road. The gravel and sand as loaded in the trucks set up remarkably and in the case of the wood body trucks frequently had to be forked out, while in the metal bodies the material slid out in a mass.

As traffic was maintained over the road at all times there were frequent occasions when the entire convict gang was called upon to almost bodily push and boost cars through the loose wet gravel. A camp, surrounded by barbed-wire fencing, was maintained by the State for the convicts on the job. Many of the men were under sentences of as high as 30 years and yet seemed a reasonably ambitious and hard working crew. The men worked 10 hours a day and their entire earnings were turned over to the State. Any overtime and Sunday and holiday work at the same hourly wage was paid to the convicts. A few groups worked on Sundays and on a few days the work was extended to as much as 14 hours.

Five Quarries Opened to Furnish Stone

In most states a quarry is a vast ledge of rock which is carefully developed for a long period of operations. On this job a quarry was any large rock or ledge that was in the way or which was conveniently located for hauling the one-man stone to the section being metalled. The quarry force consisted of a blacksmith and helper, both free labor and employees of the contractor, and a powder man, a convict, and a gang of drillers and laborers for hand loading stone to the flat bed trucks, also convict labor.

Portable Blacksmith Shop

The colored blacksmith had a knack for making the work run smoothly and for creating time-savers out of materials at hand. The blacksmith shop was kept close to the drilling so that the helper could look after the two Ingersoll-Rand portable compressors which were hooked up together to furnish air for the four drills and the forge. When only one or two drills were working one of the compressors was shut down.

A long piece of steel was hung at the top of the shed with the ball-bearing axle from a discarded truck rigged to run on it and to hold a chain and hook to support long pieces of steel when they were being heated. Steel up to 14 feet was used although most of the steel ran from 4 to 6 feet.

The anvil and a bench were arranged at the same elevation so that the steel would lie flat when being sharpened. At the side of the bench was a sloping shelf that held the steel at the proper angle when the angle of the bit was hammered. The anvil itself had a notch cut in the top of the proper dimensions so that when bits became lop-sided they could be dropped in the notch and hammered until the two sides were uniform.

Bits were formed on the new steel by heating the end to the proper temperature, slipping the steel into a jackhammer and pounding away on a piece of boiler plate until the end was sufficiently upset to make a good bit.

These little aids to speed and ease operations were well worth while as the blacksmith and his helper handled all the sharpening and on some days when the four drills were working in hard rock the steel was dulled rather rapidly and calls for fresh bits were frequent.

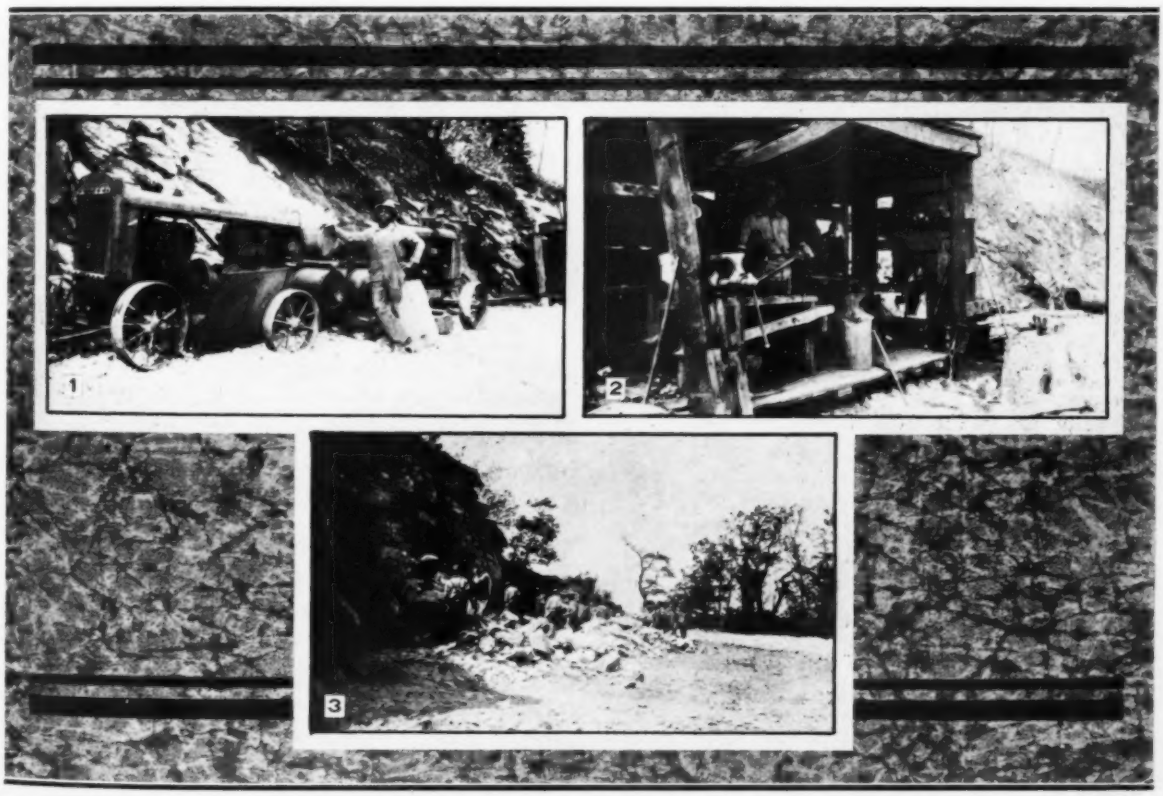
SPREADING THE BASE

The stone was well broken up at the quarries by using Union 40 per cent gelatine dynamite so that it could be loaded by hand. The stone was unloaded on the road by a gang of 9 convicts and hand napped or broken down from the 8-inch depth to 6 inches thick. The loading gang at the quarry plus the drillers' consisted of 28 convicts. There were a total of 63 convicts on the job including the cook at the camp.

TOP COURSE CRUSHED IN PLACE

Stone for the top course was hauled from the quarries on flat bottomed trucks holding about 2 yards of one-man stone. The trucks drove up on either side of a portable Cedar Rapids Universal crusher mounted on a pair of I-beams and carried on a pair of Rex crawlers. The crusher was powered by a Buda gas engine mounted on the front end of the I-beams and the whole outfit was pulled along the road as needed by a Caterpillar Sixty tractor. The run of the crusher dropped on a pan and was shovelled to the sides and center of the road by 4 convicts. There were 4 convicts on each truck tossing the stone to the crusher and one on the crusher to guide any odd-shaped stone into the 12 x 24-inch jaws without wedging. The run-of-crusher stone ran from dust to 3 inches in diameter and was laid down 5 inches deep.

When a sufficient length of road was surfaced in this way a Caterpillar Sixty pulled an Adams grader with 12-foot blade along the roadway pushing the stone to the sides. Following this a smaller Universal crusher with 8 x 16-inch jaws and powered with a Continental motor was pulled along the road by a Caterpillar Thirty and the bladed stone forked in by a gang of four con-



COMPESSED AIR OUTFITS, BLACKSMITH SHOP AND QUARRY ON THE BLOWING ROCK, N. C., JOB

1. The two I-R portable compressors hooked up to supply air to the jackhammers at the quarry and for the blacksmith shop seen at the right. 2. The outdoor blacksmith shop showing the bench and other handy devices arranged by the blacksmith himself. 3. One of the quarries operated by convict labor

PLACING THE CRUSHED STONE AND RIVER GRAVEL TOP COURSE

1. The portable Cedar Rapids Universal crusher outfit served by two flat bed trucks. The run of crusher stone dropped to a sheet steel pan and was forked and shovelled to place on the road. 2. View of the crusher outfit completely manned by convict labor. 3. Fill at the easterly end of the job with river gravel spread by convict labor

victs and crushed finer for the filler stone. This was the last operation in the contract except that another crew shovelled the crushed product to spread it over the surface.

The top stone ran about 33 yards per 100 feet of 30-foot roadway. The contractor received 50 cents per square yard for the base course and $2.90 per cubic yard for the top with a sliding scale for overhaul over 2,000 feet. The top stone was spread between wood forms of 2 x 6-inch x 12-foot planks held in place by 2 iron stakes.

PERSONNEL

The contract was awarded to Nello L. Teer of Durham, N. C., whose brother, W. H. Teer, acted as Superintendent throughout the work. A. B. Cole was Resident Engineer for the State Department of Highways.

Current Revenues Pay for New York State Roads

IN the future, new roads in New York State will probably be built entirely without borrowing, the financing to be done out of current revenues, is the prediction made in a survey on public construction prepared by the Committee on Recent Economic Changes of the President's Conference on Unemployment. Figures are presented showing that in recent years new roads in New York State have been paid for almost entirely out of current revenues and that the tendency is toward complete elimination of borrowing on that account.

In the 12-year period from 1895 to 1906, when road building by New York State was negligible, the cost was entirely paid for out of current revenues. In the following period of 13 years from 1907 to 1919, the new road building expenses were met almost entirely by borrowing. Between 1920 and 1929, the costs came out of both borrowings and revenues, the proportion of the latter having steadily increased from 30.3 per cent in 1920 to 97.6 per cent in 1928.

In 1921, out of $10,500,000 spent for new highways, $5,132,000 came from bonds, and $5,368,000 from revenues; in 1922, out of $15,318,000 spent, $6,710,000 came from bonds and $8,608,000 from revenues; in 1923, out of $11,192,000 spent, $3,939,000 came from bonds, and $7,253,000 from revenues; in 1924, out of $10,563,000 spent, $2,659,000 came from bonds and $7,904,000 from revenues; in 1925, out of $12,590,000 spent, $1,342,000 came from bonds and $11,247,000 from revenues; in 1926, out of $12,389,000 spent, $716,000 came from bonds and $11,673,000 from revenues; in 1927, out of $14,342,000 spent, $428,000 came from bonds and $13,914,000 from revenues; in 1928, out of $18,976,000 spent, $448,000 came from bonds and $18,528,000 from revenues.

Prior to 1898, according to the survey, the building and maintenance of public roads in New York State was the function of local governments. A large scale program by the state government began in 1905 with the authorization, by popular vote, of a $50,000,000 bond issue for highway construction. In 1907, the state adopted a plan for the improvement of 14,000 miles of roads. By 1912, when bond issues were exhausted and no current revenue was available for road building, the project of 1907 was a little more than half completed. In 1912, therefore, the state legislature was empowered again to contract for a further issue of $50,000,000.

Although the two bond issues, totalling $100,000,000 have furnished the bulk of the funds for highway construction, current revenues are contributing an increasingly important share and the present trend indicates that borrowing for this purpose in the future will be unnecessary.

Which Do You Prefer?

Low Bid by Irresponsible Contractor Which Apparently Saves Money for the Taxpayer

Or

An Honest Bid Somewhat Higher With Fair Profit for the Contractor and a Job That Lasts

By

Hamilton M. Wright

WITH the vast increase in road construction which now reaches one and one-half billion dollars annually for county, state, and Federal roads in the United States, the number of irresponsible bidders on road contracts is increasing throughout the whole country, according to the Bureau of Contract Information, Inc., an organization promoted by the Associated General Contractors of America and authorized by leading surety companies, to furnish advance information as to the qualifications, equipment, past performance, and financial standing of bidders on large projects. This is necessary because irresponsible bidders are causing untold losses to the public in poor roads or forfeited contracts.

A very large proportion of contractors today, if forced to liquidate, would be found irresponsible, according to S. M. Williams, president of the bureau. He cites the case of a contractor who had applied recently for bonds in order to qualify as a bidder on a stretch of road but who on investigation was found to be owing $120,000. The application for a bond was refused. Countless delays in road construction and improperly built roads, many lawsuits and heavy road repair bills are said to result from the prevailing method of awarding bids.

Bureau of Public Roads Lending Aid to Movement

For the past three years the U. S. Bureau of Public Roads has led in a movement to eliminate the irresponsible bidder by requiring prospective bidders on road contracts to fill out blanks fully setting forth their past performances, equipment, financial standing and experience. This plan has been meeting with great success, as irresponsible contractors hesitate before attempting to fill out the prequalification blanks. And they usually abandon the idea altogether. Many state

Commonwealth Avenue, Boston, an Example of a Much Traveled Street That Remains in Good Condition, Owing to Careful Work and Good Materials When the Pavement Was Laid

road bureaus have adopted the plan for the prequalification of bidders on public roads which is gaining rapidly; prequalification of bidders has been in use in Wisconsin for six years.

MORE THAN A BOND NEEDED FOR QUALIFICATION

Generally speaking the prevailing system for the technical qualification of bidders on public roads throughout the United States is the issuance of bond guaranteeing the completion of the road according to specifications. Something further is now required, according to authorities on the subject, since experience, equipment, successful past performance, financial ability, and integrity are essential to the complex art of building a modern road that will stand up under traffic. Through fulfillment of the technical bonding qualifications, irresponsible contractors are said to underbid responsible firms and even go below official engineering estimates by a wide margin, with the result that the road is either thrown back upon the public or the "job is robbed" or far less than maximum performance is produced in a very large number of cases.

THE QUESTION OF AN AWARD TO THE LOW BIDDER

The practice of invariably awarding the bids to the lowest bidder is so firmly established that public officials hesitate to incur censure by refusing him the contract even when they know he cannot do the work properly. On this point, Thomas H. MacDonald, Chief of the U. S. Bureau of Public Roads, said recently before a board meeting of the Associated General Contractors:

"As one of our engineers suggested, the right to bid on public works seems to be a matter that the public feels is an inherent right of citizenship, along with the right to vote; and that any public official who dares to take the stand that a contractor ought to be reasonably qualified to perform before he bids upon a contract, large or small, is in some way entering into an intrigue to stifle competition. There can be no competition of inefficiency and efficiency—or between inefficiencies that is helpful to the public. The only competition that can be helpful to the public is the competition of efficiency. And in the forest road work, and in the National Park road work, we have for three years prequalified the contractors.

"In 1928, we had 193 applications for prequalification blanks; and from that number qualified 189. The truly wholesome effect of this qualification of bidders seems to be that the man who is not financially qualified or properly equipped to conduct a contract come to that realization when he quietly faces one of the prequalification blanks before he has put in a low bid. In the old days, as you know, the awakening came sometimes after making the low bd. Neither he nor the public official knew what to do about it, because after a low bid is once recorded in the minutes of the public body and repeated in the press, the public looks upon it as a nice juicy plum just within reach. If the public official takes it away by saying, 'This man can't do the work at these prices—can't possibly do the work at these prices,' the public mind at once is turned questioningly toward his veracity. So the public official in self protection hesitates to turn down the low bidder. Consequently he is in a much better position if he never receives an unreasonably low bid than to have it entered on the record. There will always be those who feel, 'Well, maybe we could have got satisfactory work at those prices,' regardless of their impossibility.

"So the important point to prequalification is that the man who would bid upon work faces the issue of responsibility before, and not after he has put in his bid. This seems to be all of the limitation of competition that is involved. In 1929 we had 276 applications for blanks, and qualified 262. In other words, in two years, only 18 applicants for prequalification were turned down; which was less than 4 per cent of the total number who applied."

At this point the writer would ask the reader for permission to diverge for a movement from the subject in hand in order to point out that it must not be inferred from these excerpts from Mr. MacDonald's address that he was condemning the contracting industry as a whole. On the contrary he paid a very high tribute to the contracting industry. In opening his address, above referred to, he stated, in part:

"In the years of Federal Aid since I have been connected with the Bureau of Public Roads, we have had something over 18,000 projects, involving more than that number of separate contracts. Practically all of these contracts have been satisfactorily completed. . . . With an expenditure totaling nearly a billion dollars, we feel that we know something about contractors and their methods. It is a pleasure to be able to say there prevails throughout our organization an appreciation of the work and of the service that the contractors have given to the production of public roads in the United States; and further, without the hearty cooperation, loyalty, and spirit of public service that the contracting industry has put into this business, we would not have been able to make the progress that we have."

But to return to our topic of the Irresponsible Bidder.

OFFICIALS NEED BACKING OF THE PUBLIC

While the prequalification clause is aimed to prevent the irresponsible bidder from getting on the record, the real fault, it is said, lies with the public which is so unfamiliar with the relative values of methods, materials, and varying costs of modern types of road construction as to be unable to back up a public official who takes an intelligent stand in awarding the contract to the bidder whose work and source of supplies, equipment, and experience promises the best road for the money. In other words, the cheapest road is not always the best; it may be much more expensive in the end than a road costing more. The average man will take an acute interest in the building of a home and will require satisfaction as to the materials going into it, but he is absolutely at a loss when contronted with the question as to the quality of stone, for example, which is going into a road. But under the prevailing system the lowest bidder is very apt to get the job even if he is an irresponsible bidder provided he is equipped with the technical qualification of a bond. While this qualification which is holdover from days when dirt roads were the rule it is not sufficient of itself for modern road requirements, and the job goes to the lowest bidder rather than to the lowest responsible bidder. Often a record of successful work in the construction of roads which have stood up in first-class style for

UNIQUE PHOTOGRAPH SHOWING A GOOD STREET IN BOTH DIRECTIONS

With streets built always by responsible contractors we shall always be able to look back on good paving

many years, is ignored for the lower bid of an irresponsible contractor.

A TYPICAL EXAMPLE

Sometimes the consequences of the failure to inquire as to the financial ability, equipment, and record of a bidder will be felt for a period of years. Mr. MacDonald, Chief of the Bureau of Public Roads, related such an incident in the address already referred to. He said:

"We have a suit pending against us right now brought by a bonding company on some work conducted by the Bureau of Public Roads in the days before prequalifications. It was in the days when every contractor who could get a bond was a qualified contractor. We didn't want the contractor—he was not a real contractor, he had neither the equipment nor the financial backing to support the job. He was able to induce a poor fellow to go into partnership with him and supply some financial backing, and had a bond written by the company which is now suing the Government, through an agent whom it had expressly forbidden to write the bond. So, the bonding company, through the act of the agent, gave itself a contractor that it did not want, and gave the Bureau of Public Roads a contractor that we did not want. Nobody was pleased, unless it was the agent who got the commission on the bond, and as far as I know, he is the only one who made any money out of the deal."

THE TOO-LOW BID IS EVERYBODY'S LOSS

It is pointed out that if an irresponsible bidder puts in the lowest bid, underbidding all his competitors by a wide margin, and his bid is accepted according to the customary practice, and is, as has often happened, far below the estimates of the official engineers, an economic pressure is exerted him to give less than maximum performance in order to come out even on the job. A contractor may give maximum performance on his contract or he may give medium performance and get by, or he even may give minimum performance and get away with it. An irresponsible contractor cannot be expected to give maximum or even medium performance.

The responsible bidder may fail on the job, involving the community in delays and possible law suits. Or, lacking the necessary equipment, experience, financial resources, he may involve others in his unfortunate contract, or if not a man of integrity, he may seek a way out by "robbing the job" skimping on materials here and there and producing a poor road, or he may abandon the work altogether.

The one real criterion of a road is what service it has given, how it has stood up for the cost. This is also, in part, a criterion of the responsible bidder. But he must have experience nowadays in addition to his existing financial ability and equipment, and a reputation for integrity. And in this way, it is believed, the country will get best value in the billions to be expended on roads.

100 Years in Business Commemorated

NOT merely 100 years in business but 100 years under the management of the same family is the unique record of the Hay Foundry & Iron Works, Newark, N. J. In commemoration of this event the firm has issued an attractive brochure illustrated with pictures of the directors of the business and an historical account of the family. It began with James Bruce Hay who started a foundry June 1, 1830 and was handed down in direct lineage until today when it is being run by the grandson of the founder, J. Lewis Hay, and two great-grandsons, John L. Hay, Jr., and Francis W. Hay. This history of this company parallels the building history of New York for it has engaged in the construction of the structural steel frames for many of the skyscrapers in and about New York, including the American Radiator Building, Transportation Building, Bank of New York & Trust Co. Building, 120 Wall Street, American Book Co. Building, Farmers Loan & Trust Building, Telephone Building on Willoughby Street and many other prominent structures.

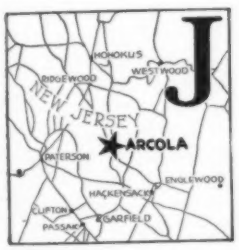
TWO CONTRACTORS MEET ON ADJACENT SEWER JOBS IN MILWAUKEE

George A. Zimmermann Company and Herman Hohensee seemed to mobilize their Koehring equipment as the photograph shows their two pull shovels, five cranes and one 13-E paver, all of the one make

70-Foot Span Concrete Arch Bridge Built *with* Dispatch

A Marlo Mud Hog Diaphragm Pump with Le Roi Engine Which Kept the Caisson Unwatered

Compact Equipment and Good Organization Speed Construction of Second Arcola, N. J., Bridge



JUST north of the reinforced concrete county bridge, the construction of which was described in the September, 1928, issue of CONTRACTORS AND ENGINEERS MONTHLY, the State of New Jersey has contracted for the construction of a new 70-foot span concrete arch bridge, 78 feet 11 inches wide, carrying a 60-foot roadway and two 8-foot sidewalks with curb. The contract was awarded to Parker & Graham, Paterson, N. J., allowing 175 working days. Work was started February 17, 1930, the first week being devoted to hauling in lumber, I-beams, steel sheeting and the Industrial-Brownhoist crane with a ¾-yard Williams heavy duty bucket.

The west foundation which was started first was excavated to the water line and about 6 inches below. The cofferdams on the east and west sides of Saddle River are 29 feet, 3 inches by 87 feet 3½ inches inside measurement. The first set of 12 x 12 cross bracing was then inserted with a frame of 4 x 6's 8 feet above to use as guides for the Larssen No. 2 steel sheeting. The steel sheet piling was then driven with a McKiernan-Terry 7-B steam hammer. For the most part the steel sheeting was easily driven but some of it was held up by 6 to 7-foot diameter stones up to 3½ feet thick while there were plenty of 2-foot stones. This made a lot of hand excavation necessary. The resident engineer's records show 1 foot of muck at the top, followed by sand and boulders which were removed by hand when within 3 feet of the bottom as the crane bucket would not dig the hard material and rocks which were encountered. A total of 14 laborers was used to clean up the excavation down to hard bottom. Above this three hard strata and considerable quick sand were found and gave some trouble.

CONCRETING

Aggregate for the first part of the job was batched by George M. Brewster & Son, Bogota, N. J., and hauled 8 miles to the job. The aggregate consisted of crushed stone, according to New Jersey specifications, and seaboard sand with Edison cement added at the skip. The 1:2:4 mix for the footing of the west abutment amounted to 273 cubic yards which was made in two pours with a construction joint in the middle of the footing. Following this, the buttresses were poured heavily reinforced with 1, 1⅛ and 1¼-inch rods which extended through the footing into the buttress. The buttress pour consisted of 3-foot walls spaced 4 feet 6 inches apart and required a pour of 290 yards in one day which was handled between 6 in the morning and 11 at night.

The haunch pour followed the buttress pour and then, after setting, it was possible to pull the sheeting with the McKiernan-Terry hammer.

As soon as the footing was poured, the 12 x 12 cross bracing was replaced by bracing against the footing in order to make way for the forms for the buttress and haunch. When the haunch pour was completed the buttresses were backfilled and then the sheeting pulled. It is interesting to note that when the bracing was removed the sheeting came in only 1 inch toward the footings because of the strength of the arch web of the individual steel sheet piles.

WORK ON EAST FOUNDATION

Operations on the east side were started March 27, the framing on top having been built ahead of schedule.

West Abutment Forms with Reinforcing Steel in Place for the Next Pour

Satisfactory progress has been made on the structure and there is no doubt that it will be completed within the 175 working days allowed.

POURING THE ARCH

All of the concrete for the foundation, buttresses, haunch and for the arch was mixed on the job with a Koehring 21-E paver and buggied to the forms. The arch forms were erected on I-beams supported by pile bents with 2-inch lumber used to support the arch.

LABOR AND EQUIPMENT

The contractors had a DeWalt electric saw on the job to handle all of the form work, a bolt threading machine for the tie rods and a Buhl portable air compressor and an ordinary riveting gun and snap was used to vibrate the forms and secure a solid concrete mass free from honeycomb.

The average labor organization on the job consisted of 5 carpenters, one crane man and a helper and about 5 laborers, although as mentioned earlier in the text, 12 laborers had to be used at times for excavating and during concreting.

PERSONNEL

Fred B. Matthews was Superintendent for Parker & Graham, contractors, Paterson, N. J., on this project. The bridge was designed and constructed under the direction of Morris Goodkind, Bridge Engineer of the New Jersey State Highway Department. Kennth Yates was the Bridge Construction Inspector on the job for the State.

Nothing is easier than fault-finding; no talent, no self-denial, no character, no brains are required to set up in the grumbling business.—Robert West.

Welding Employed on Albany Building

NOT only the framework and roof trusses are being welded in the new service building being erected by the New York Power & Light Corp., in Albany, N. Y., but the roof itself and a large part of the steam piping is being installed by that method. The new building is 375 feet long and 198 feet wide, partly single-story and partly multi-story in design. Steel work was started in May and it is expected that the structure will be completed by September.

About 700 tons of steel will be involved in the structure. The general contractor is John P. Sewell, while the multi-story section of the building is being erected by the Belmont Iron Works of New York and Philadelphia. All of the welding is being done with General Electric welding equipment. It has been estimated that about 30 tons of steel was saved by using the welding method.

One of the novelties in the construction of the building is the installation of an all-steel roof of the steel deck type, completely welded. Sections of shaped steel resembling corrugated forms will be welded in interlocked positions and the whole covered with the usual type of roofing material. In addition, all steam pipe above 2 inches in diameter will be electrically welded.

Suggestion to Distribute Contract Lettings Throughout the Year Adopted

THE following motion was passed by the Executive Committee of the American Association of State Highway Officials which met in May in Washington:

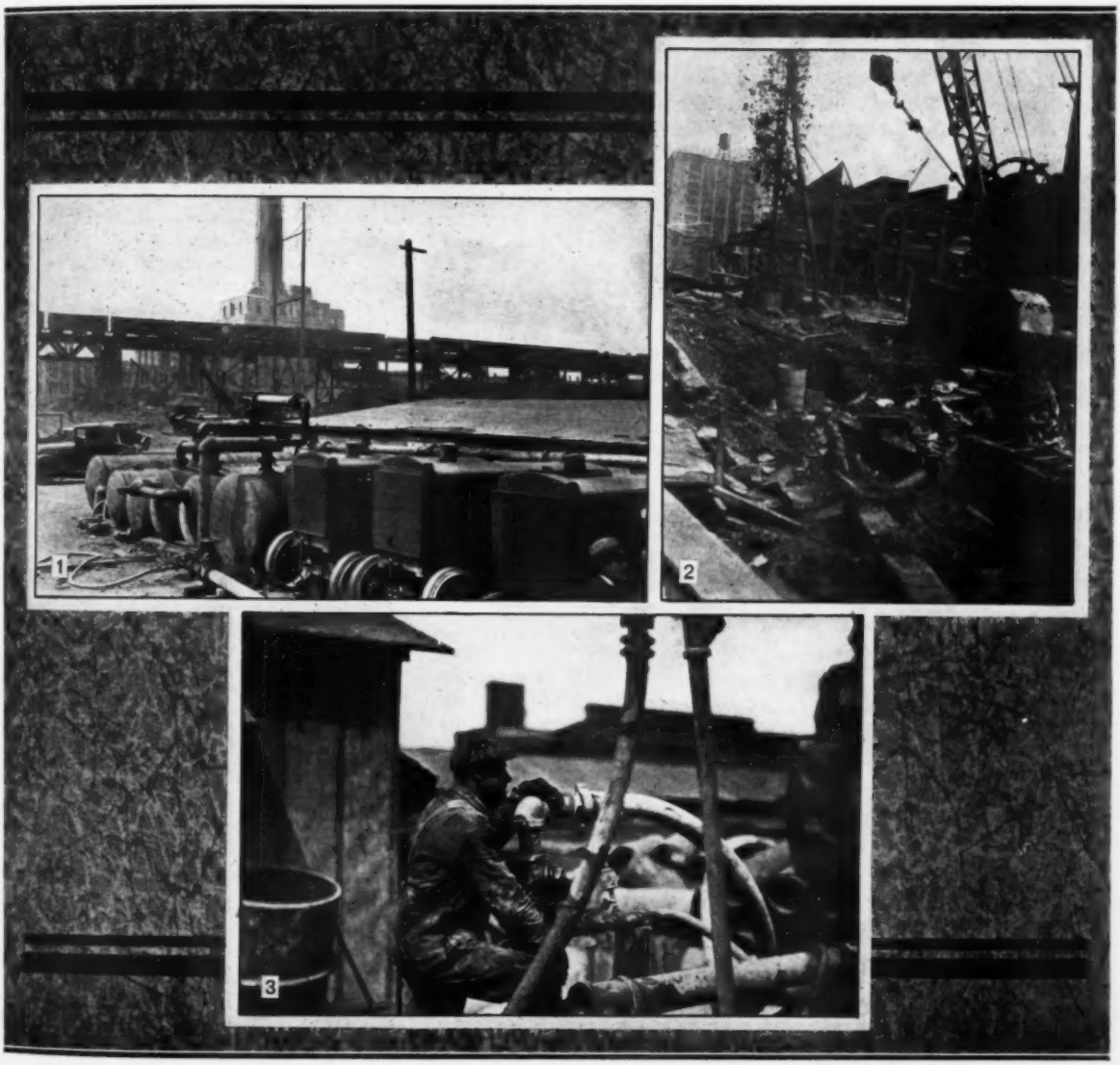
"On behalf of the Association it was recorded that the Highway Departments favor using their influence to dissipate peaks of contract lettings so that they may be distributed through the year, not only in the interest of labor but also for the more satisfactory distribution of materials and the purchase of equipment necessary for the work. To this end the Committee on Cooperation with Contractors and the Committee on Cooperation with the American Road Builders Association were requested to lend their assistance to the Manufacturers' Division of the American Road Builders Association and the contractors to bring about satisfactory conclusions."

Pile Hammer *and* Steel Piling

Handled by Battery of Portable Compressors Instead of Usual Large Stationary Outfit

on West Philadelphia Job

FLEXIBILITY is one of the most important features of any piece of construction equipment today. If equipment can be used solely for one purpose it must be used all of the time or must be a very inexpensive piece of equipment to make it a paying proposition. The portable air compressor, which has done much in recent years to speed up work and lower construction costs, played the premier role in the



COMPRESSED AIR BATTERY AND USES ON THE TERMINAL JOB AT WEST PHILADELPHIA, PA.

1. Three 10 x 8 I-R portable air compressors hooked up to five air receivers with an 8-inch line. 2. A 3-inch blow-off pipe opened wide to remove the mud in the Hercules steel piling. Note the geyser of mud in the air. 3. The operator of the quick action valve on the blow-off line

placing of footings for the Pennsylvania Terminal Improvement at West Philadelphia.

The Underpinning & Foundation Co., Inc., the contractors for this work, instead of installing one large stationary compressor set up a battery of three 10 x 8 Ingersoll-Rand portable compressors. This battery supplied the air required by a 9-2-B McKiernan-Terry hammer and the blow-off pipes for sinking the Hercules steel piling. This type of work naturally requires a very large volume of air at certain times, while at other times very little air is required on the job.

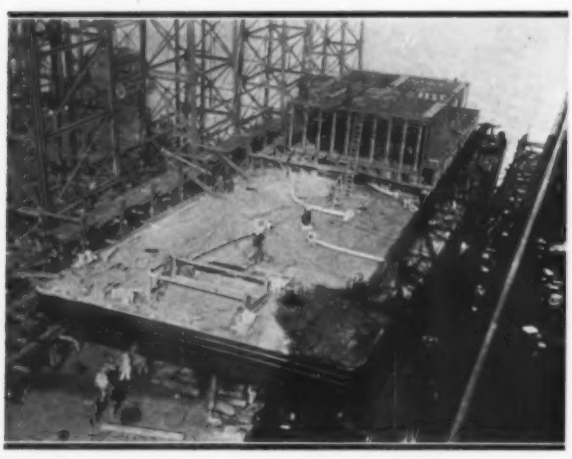
THE SET-UP

Each of the compressors has a displacement capacity of 310 cubic feet and is connected to an 8-inch pipe. The five air receivers shown in the illustration are also connected by 8-inch lines. This permits the storage of a large amount of air and greatly reduces the pressure drop in the lines, even though the storage capacity is heavily drawn upon at frequent periods. The compressors are set to unload at 95 pounds pressure, while only 80 pounds working pressure is required for the hammer and for blowing purposes.

An installation of this kind has many advantages over the large stationary units formerly employed on similar jobs. The machines can be taken to the job, the receivers piped up and the outfit placed in service in a few hours time. One, two or three of the compressors may be operated, according to the amount of compressed air required. No foundations are needed, and one or all of the machines can be disconnected from the line and quickly taken to any other point of the job or to an entirely separate job where compressed air may be required.

Huge Floating Derrick for Service at Los Angeles

THE Merritt-Chapman & Scott Corp., New York City, has added to its great "Black Horse" service fleet the new floating derrick Los Angeles which was launched in February at the Union plant of the Bethlehem Shipbuilding Corp., at San Francisco. This new derrick, which is capable of lifting 90 tons overside, rounds out the company's equipment service on the Pacific Coast. The hull of the Los Angeles is of steel throughout including guards and deck rails and its bottom is rounded at the ends with vertical sides. The extreme length is 125 feet and the molded length 124 feet 5 inches. The extreme width outside of fenders is 45 feet 6 inches, its depth amidships 12 feet and from the ends to the base line 13 feet.



Launching the Hull of the New Derrick "Los Angeles" of the Black Horse Fleet

A deck house 51 feet 10 inches long, 32 feet 4 inches wide and 15 feet 6 inches high provides ample area for every purpose. The forward part of the house to the roof is occupied by the engine and boiler compartments. Aft of the engine room, an intermediate deck is located in which galley, mess room and accomodations for a crew of ten are provided. There are four officer's rooms with accommodations for two men in each.

The hoisting engines, built by the Lambert Hoisting Engine Co., can swing 90 tons overside and operate on multiple sheave blocks. The main engine is equipped with 4 drums, while the auxiliary engines have 8 drums and 4 mooring drums. An oil-burning boiler of the vertical type is installed. The Los Angeles has a 95-foot steel boom with a steel A-frame 98 feet above deck. The giant hoisting mechanism was commissioned in May.

Changes Suggested for Foundation Regulations for Big Buildings in New York City

MEASURES calculated to increase the strength of foundations of big buildings, and at the same time, to reduce materially the cost of constructing them, have been proposed to the Merchants' Association's General Committee on the Revision of the New York City Building Code by its Subcommittee on Foundations. The findings of this committee have been in general along the lines of greater safety with provision, wherever possible, for the reduction in cost of the foundations of future buildings to be erected in New York.

The outstanding policy is to provide that the foundation shall be constructed under expert advice and supervision. It is required for instance that in connection with the filing of plans for all buildings over 50 feet in height, information must be furnished to the Building Department as to the character of the underlying soil to bed rock. Furthermore the designing engineer must file an affidavit stating that he has examined the foundations during construction and that they are built in accordance with the plans and the Code requirements.

Provision has been made to encourage the use of deeper foundations, as the deeper the foundation penetrates below the surface the less likelihood there is that it may be disturbed by adjacent building operations. To accomplish this, a premium is provided by increasing the allowed loading upon the sub-soil proportionate to the depth to which the foundations are carried below the surface. Another provision recommended by the Subcommittee is that provision shall be made for the weight of foundations themselves together with the weight of overlying fills and floors. The use of concrete piles has been somewhat amplified. Under the provisions of the present Code piles of this character can not be used where their length much exceeds 40 feet because of the fact that only one splice is allowed. It has been recognized that piles of this character and of much greater length could safely be used and therefore provision for such use has been made, allowing any number of splices but with a proper reduction for each splice in the load capacity of the piles.

Along the lines of a more liberal policy affecting the cost of foundations the Subcommittee has, in some cases, increased the presumptive bearing capacity of different types of soil. A new classification of medium hard rock has been added. The possibility of considerable saving has been provided for in cases of foundations which bear upon different types of soil in different parts of the building. Under the present Code 50 per cent of the allowable bearing capacity must be deducted from the presumptive bearing capacity of the weaker of the soils. It is proposed that the bearing capacity of weaker materials shall be reduced much less drastically.

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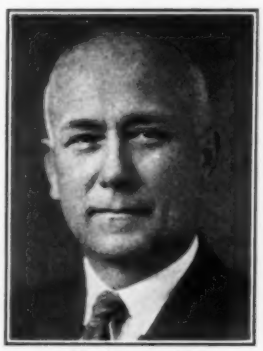
Water Softening and Filtration Plant at New Ulm, Minnesota

Office of Charles Foster

PREVIOUS to the building of the softening and filtration plant, all water for the city of New Ulm was obtained from deep wells. The water contained 26.5 grains of incrustants per gallon. In 1929 the output of the wells was not sufficient to supply the demand and the matter of additional supply was a problem to be solved.



Charles Foster

Charles Foster, Consulting Engineer, was retained by the City Council and a study and investigation was made. It was recommended that wells be abandoned as a source and that a filtration plant be built and that the plant be designed for both softening and filtering the water. The recommendations of the engineer were adopted and the softening and filtration plant was designed and built.

The raw water is obtained from the Minnesota River. The water is at times, especially during the spring months, rather turbid but fairly soft and during the winter months quite hard containing 30.5 grains of hardness per gallon.

The plant is designed for an ultimate capacity of 2,500,000 gallons per 24 hours of continuous operation. At the present time the capacity is 1,500,000 gallons per 24 hours of continuous operation.

The raw water pumping plant is located on the bank of the Minnesota River approximately 3,000 feet from the filter and softening plant and consists of an intake well with screens and pump house. The intake well is built as a part of the retaining wall at the river bank. The pump house is located approximately 30 feet from the intake well and is connected by means of an 18-inch cast iron pipe which is the suction line for the pumps.

The two centrifugal pumps are each of 1,000-gallon per minute capacity with the motors located on the pump room floor and the pumps at the bottom of the well, 30 feet below the pump room floor. The pumps are controlled from the filter plant, but may be operated from the pump house.

The raw water pumping plant is connected to the filter plant with a 12-inch cast iron discharge main which discharges into the mixing chamber at the settling basin at the filter plant. The pumps were manufactured by the Manistee Iron Works in duplicate, each being the present capacity of the filter plant. The space in the pump house is sufficient to permit pumps of greater capacity being installed should the demand for water require the additional capacity.

The raw water is pumped from the river to the mixing chamber where the lime and soda ash are added. Wallace & Tiernan dry feed machines are used. After leaving the mixing chamber the water flows to the settling chamber which is 67 feet long, 27 feet 3 inches wide and 23 feet in depth. This chamber allows a retention period of approximately 4½ hours.

From this settling basin the water flows to a second mixing chamber at which point alum is added by an-

(Continued on page 80)

The New Ulm Filtration Plant Designed by Charles Foster

The Consulting Engineer

A Section of

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Contents

Allen Hazen Passes

IT was with a great sense of loss that the consulting engineering fraternity learned of the sudden death of ALLEN HAZEN, prominent New York sanitary engineer, on July 26, in Montana. Mr. Hazen has served many cities well in the development of their water supplies and has served his fellow engineers through his long activities in the American Society of Civil Engineers, culminating in his election as Vice-President.

Water Softening and Filtration Plant at New Ulm, Minn.

(*Continued from page 79*)

other W & T dry feed machine. As the water leaves this mixing chamber it flows to a coagulating basin of capacity equal to the settling basin. As it leaves this basin the water flows to the filters.

The filters are three in number, each having a capacity of 500,000 gallons per 24 hours. They are equipped with Simplex Valve & Meter Co.'s rate of flow controllers and rate of flow and loss of head gages. All valves are hand operated and all valve stems are extended to floor stands on the operating floor of the building.

The clear well is located below the filters and is approximately 50 feet by 60 feet by 12 feet in depth. From this clear well the water is pumped to the city distributing system which includes a storage reservoir having a capacity of 1,000,000 gallons.

The pumping equipment at the filter plant consists of two 1,000-gallon per minute Manistee horizontal centrifugal pumps directly connected to General Electric motors.

Two W & T chlorinators are installed and so connected that chlorine may be added at several points in the cycle of operation as may be found expedient for best operation.

Simplex Valve & Meter Co.'s meters are provided for both the raw water as it enters the plant and the clear water as it leaves the plant. A meter is also provided to record the water used for washing filters and other uses about the plant. Pressure gages are installed to indicate the pressure of the raw water as it enters the plant and of the clear water as it leaves the plant, the air pressure and the suction lift of the clear water pumps.

A motor-driven air compressor is installed to furnish air at a low pressure to assist in mixing the chemicals in the first section of the mixing chamber. This air may also be used to assist in aeration if found necessary.

All the construction underground is of reinforced concrete. The filter house and raw water pump house above ground are of brick with precast stone trim. The floor of the pump room is concrete, the main floor is of red quarry tile and the walls and ceiling are plastered. A complete laboratory is located on the main floor and is fully equipped. Storage space is provided for chemicals on the pump room floor level. Chemicals are hoisted to the dry feeder room by means of an electric hoist. A store room is provided for the chlorine containers.

The entire plant is electrically driven. Current is obtained from the lines of the municipal electric plant. The switchboard located on the pump room floor is provided with meters by which the electric current is metered and recorded, a meter being provided for the raw water pumping plant and one for the filter plant.

The plant was designed by Charles Foster, Consulting Engineer, Duluth, Minnesota, and was constructed by the Woodrich Construction Co., Minneapolis, Minnesota. Robert Mullin is Superintendent and in charge of operation.

Indiana Engineer Presents Paper Before Sewage Works Association

A PAPER entitled "Interpretation of Technical Reports" was presented by Edwin C. Hurd, Assistant Sanitary Engineer in the firm of CHARLES H. HURD, Consulting Engineers, Indianapolis, Ind., before the Central States Sewage Works Association at Springfield, Ill., in June. Mr. Hurd has given special study to the use of laboratory analyses in their relations to sewage plant construction and operation.

Work now being carried on in the office of Charles H. Hurd includes plans for sewage treatment plants for the cities of Rochester and Winchester, Ind., for Imhoff tanks and sprinkling installation for the Indiana State Reformatory, Pendleton, plans and specifications for a new river pumping station and water filtration plant, Bedford, Ind.; sludge dehydration plant, Indianapolis; plans and specifications for Broad Ripple interceptor, Indianapolis; and glass covered drying beds for the sewage treatment plant, Frankfort, Ind.

Recent Articles Published by Kansas City Engineers

AMONG the recent articles prepared by members of the HENRICI-LOWRY ENGINEERING Co., 508-16 Huntainger Building, Kansas City, Mo., are "Cotton Industry in Soviet Russia" in the *Textile World;* "Building Construction in Russia," which appeared in the *Western Contractor;* "A Kansas City Engineer in Russia" in the *Kansas Citian,* and a paper "Electricity in Use," for the Missouri Association of Municipal Utilities.

This firm is now preparing plans for a municipal wharf for Kansas City, Mo., and a power plant for a hospital at Farmington, Mo., reports on mining properties at Jamestown, Colo., and on irrigation for Hidalgo County, Texas and a large natural gas survey and appraisal.

Members of this company were called as expert witnesses in a gas line appraisal case, St. Louis, Mo.; a hydro-electric condemnation, Osceola, Mo., a gas explosion case, Kansas City, Mo. and a series of telephone and water plant appraisals.

Various Water Projects Planned by Texas Consultants

THE work now being carried on in the office of HAWLEY, FREESE & NICHOLS, 411 Capps Building, Fort Worth, Texas, includes the preparation of a report on water supply for Eastland, Texas, plans and specifications for a sewage treatment plant and outfall sewer for Big Spring, Texas, flood control for Oklahoma City and a study of the navigation of of Trinity River for the Dallas Chamber of Commerce.

This company is also supervising the work on two large dams being constructed by the Tarrant County Water Control and Improvement District No. 1 at Eagle Mountain and Bridgeport; the water supply filtration plant and sewage disposal plant, Sweetwater, Texas; the enlargement of pump stations, Fort Worth, a water supply project, Beaumont, Texas, and a paving contract, Graham, Texas.

In the recent Austin Dam case, this firm was called as expert witness.

Black & Veatch Preparing Reports and Plans on Municipal Projects

E. B. Black

REPORTS and plans for various municipal projects are now under way in the offices of BLACK & VEATCH, Consulting Engineers, 701 Mutual Bldg., Kansas City, Mo., including sewage disposal plans for Wichita, Dodge City and Abilene, Kansas and Grand Island, Nebr.; water works projects for Sturgis, Ky.; Meeker, Colo.; Tucson, Ariz.; Franklin, Nebr.; Warsaw, Mo., and Evansville, Ind.; flood control work for Salina, Kans., and for Herington, Kans., and Council Grove, Kans., and on a water works and sewage disposal project for Baldwin, Kans., as well as sewers for Woodward, Okla.

They have recently represented the city of Wichita, Kans., in its case against the Wichita Natural Gas Co., before the Master of the Federal Court, and have represented the city of Fort Worth, Texas, in litigation against the Fort Worth Gas Co. They have also acted as expert witnesses in the stream pollution case of W. S. Dickey Clay Mfg. Co., vs. the city of Harrisonville, Mo., in the U. S. District Court for the Western District of Missouri.

N. T. Veatch, Jr.

N. T. Veatch recently delivered a paper on "Water Requirements in Arid Climates" at the St. Louis meeting of the American Water Works Association.

Daggett Opens Consulting Offices in Milwaukee

ANNOUNCEMENT has just been made of the opening of offices by GORDON F. DAGGETT, at 2404 Clybourn St., Milwaukee, Wis., specializing in the design, construction and equipment for sand, gravel and crushed stone plants.

Mr. Daggett is a graduate civil engineer from the University of Wisconsin, and has had several years experience in this line of design and construction. For a number of years he was Materials Engineer for the Wisconsin Highway Commisson, following which for three years he was Executive Secretary and Consulting Engineer to the Commercial Sand, Gravel and Crushed Stone Producers in Wisconsin, whose plants had a total of over 6,000,000 tons per annum. Early in 1929 he resigned and became affiliated with the Boehck Machinery Co., Inc., of Milwaukee, as a member of the firm and its Chief Engineer. He is retaining this connection. Mr. Daggett has specialized strongly in the analyses and tests of road building materials for concrete and expects to make this one of his strongest lines in the future.

Consulting Briefs

Caldwell & Richards, Engineers, 407 Templeton Bldg., Salt Lake City, Utah, are preparing plans for water works replacement and construction for American Fork, Utah County, Utah. It is to be a gravity system of spring water, costing $190,000. Bids for materials were opened in April and for labor in May.

The American Fork city water works system is being improved in two parts; first, by the replacement of wood pipe with cast iron in the distribution system and second, bringing in a new source of water supply from a canyon spring.

Henry J. Saunders, Consulting Engineer, 643 Transportation Building, Washington, D. C., was recently called as expert witness in a recapture of excess earnings case before the I. C. C. for Roscoe Snyder & Pacific Railway Co. and St. Paul Bridge & Terminal Railway Co.

McNamara & Nosky, 571½ Dewey Street, North Platte, Nebr., are working on plans for a paving project for Ogallala, Nebr., and a drainage project for Dawson County, Nebr. Construction which is going on under their supervision includes irrigation projects for Buffalo and Keith Counties, drainage projects for Dawson and Lincoln Counties and a paving project for Gothensburg, all in Nebraska. L. J. Nachtrab and L. T. Trexler, Civil Engineers, have recently joined the staff.

T. R. Atkinson, Consulting Engineer, Bismarck, N. D., is at present engaged in the preparation of plans for water mains and sewer extensions for the city of Hebron, N. D. Victor A. Johnston has recently joined Mr. Atkinson's staff.

W. G. Caldwell, 262 West Broadway, Waukesha, Wis., is supervising the construction under way in the Brookfield, New Berlin and Muskego Drainage Districts. In a recent litigation of the Muscoda Toll Bridge Co. vs. Wisconsin Highway Commission, Mr. Caldwell acted as expert witness.

R. Husselman, Consulting Engineer, 688 Union Trust Bldg., Cleveland, Ohio, is preparing reports on a light plant for the city of Richmond, Ind., and on electric rates for Ellwood City, Penna. Mr. Husselman was recently called by the city of Martinsville, Ind., as intervener in a case of the Wabash Valley Electric Co. vs. Public Service Commission of Indiana.

E. F. Layman, 514 Main Street, Cincinnati, Ohio, was recently called as expert witness in the case of Greenly Hann vs. the C & O Railway of Indiana over the proper location of the right of way.

Smith & Riddle, Inc., 210 Royal Palm Way, Palm Beach, Fla., are supervising the improvements on the grounds of the Joseph E. Widener estate, the addition to the club building and new water supply for the Seminole Club, swimming pool supplies for N. Spingold and Paul Moore and the building of a bulkhead and fill and ground improvement for Major B. H. Warburton.

William T. Muldrew, Jenkintown, Penna., is working on plans for a sanitary sewer system for the Borough of Hatboro, Penna., the construction of which will be carried on under his supervision. Bids have been received for the first unit of about 2 miles.

Langford & Moreau, 2405 Grace Street, Chicago, Ill., are preparing plans for an athletic field for the Lane Technical High School, Chicago; landscape construction for E. B. Bartlett, West Allis, Milwaukee, Wis., and reconstruction of the Mid-City Golf Course, Chicago. This company was recently called as expert witness in the City of Chicago-School Board vs. Mid-City Golf & Amusement Co. case, in regard to the condemnation of 30 acres—six holes of a golf course.

Charles Lyon Wood, Columbus, Miss., is engaged in the preparation of plans for a 75-foot steel bridge with concrete floor over Cedar Creek, Lowndes County; a concrete or asphalt plank floor 14 x 220 feet on the water works bridge, Columbus, and a concrete floor on a 100-foot trestle over the Luxappalila River, Lowndes County. Work on the steel and concrete bridges and approaches at Yellow Creek and Luxappalila River, both in Lowndes County, is going on under Mr. Wood's supervision.

Quinton, Code and Hill-Leeds and Barnard, Consolidated Engineers, 712 Standard Oil Building, Tenth at Hope Streets, Los Angeles, Calif., is a recently formed consolidation of the firms Quinton, Code and Hill and Leeds and Barnard to carry on jointly a broader engineering practice than has been possible separately. Members of the firm are Louis C. Hill, William H. Code, Raymond A. Hill, Charles T. Leeds, Wilfred K. Barnard and Archer F. Barnard, all Members, A. S. C. E.

H. L. Thackwell, Consulting Engineer, 610 So. Bolton St., Jacksonville, Texas, is preparing plans for street paving for Livingston, Longview and Jacksonville, Texas, and for a sewage disposal plant at Longview. Sewers and a sewage disposal plant at Tyler, Texas, and water and sewage plants at Port Neches, Texas, are being constructed under Mr. Thackwell's supervision.

S. S. Gorman, Merchants Exchange Building, San Francisco, Calif., is supervising the construction of a saltery, covering 2 acres, and of the tower frame for a hydro-electric installation.

Guy Wilfrid Hayler, 453 34th Ave., San Francisco, Calif., is at present working on surveys covering the industrial development of the San Francisco Bay area, and also reports covering city planning in San Francisco and suburban towns. Mr. Hayler is an Associate Member, Amer. Soc. C. E.

Hill & Hill, Marine Bank Bldg., Erie, Pa., have recently added E. I. Sprague to their staff. According to Theodore C. Hill, this office is now working on plans for a sewer system and sewage disposal plant for Girard, Pa.

Howard S. Reed and Sheldon K. Baker have their engineering offices in Rooms 417-20 Fleming Bldg., Phoenix, Ariz. These engineers are now working on reports and plans for the Camelback Water Conservation District, and for the electrical district of Maricopa and Pinal Counties, No. 5, and on plans and construction work for the Town of Valencia, Arizona. They are also supervising road construction in Valencia.

Municipal Improvements Under Way on Pacific Coast

A REPORT on sewage treatment and sewer improvement as well as a preliminary report on garbage disposal is being prepared for Palo Alto, Calif., by BURNS-MCDONNELL-SMITH ENGINEERING CO., 454-457 Western Pacific Bldg., Los Angeles, Calif. Other work of this company includes plans for a water filtration plant for Weiser, Idaho; report on a 4,000,000-gallon water filtration plant for Brawley, Calif.; sanitary sewers for San Juan Capistrano, Calif.; water works improvements for Whittier, Calif.; sanitary sewers, Gonzales, Calif., and sewage treatment, Elko, Nev.

Sewer improvements and the construction of a sewage treatment plant at Salinas, a water works system, Downey and reservoir construction at Burbank are being carried on under the supervision of this firm.

H. J. Rosson and E. B. Fairbairn recently joined the staff of Burns-McDonnell-Smith Engineering Co.

New Haven Firm Has Several Connecticut Projects Under Way

INCLUDED in the work now being carried on in the office of WESTCOTT & MAPES, INC., Engineers, 139 Orange Street, New Haven, Conn., and Chanin Bldg., New York City, is the preparation of plans for a central heating plant for the Connecticut Agricultural College and for a turbine foundation and bus structure for Steel Point Station, United Illuminating Co., Bridgeport, Conn.

Construction now going on under this firm's supervision includes the turbine foundation, extension of the coal-handling trackway and sea wall for the English Station, United Illuminating Co., New Haven; an extension to the building which is to house an 1,100-kw diesel engine installation for the South Norwalk Electric Works, South Norwalk; and an airport for the City of New Haven.

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The Editor Comments —

Pennsylvania Pushes Paving

After a 10-day trip through Pennsylvania, visiting a number of the larger paving and bridge projects under way, I dropped into Harrisburg to call on Samuel Eckels, Chief Engineer, State Department of Highways. Mr. Eckels is justly proud of the record which contractors have set in Pennsylvania by completing 400 miles of new paving on July 10 and it was expected that by August 1, 500 miles would be completed. The entire program for the present construction season calls for the completion of 1,016 miles of new pavements within the state.

Many of our readers will recall the very interesting appeal sent out by Mr. Eckels last Fall to all contractors and material producers to make arrangements for their shipments of aggregate and cement as well as reinforcing and asphalt requirements that there might be no delays during the 1930 construction season. The response to this call by all parties was remarkable and is one of the major reasons why the program is advancing so well at this season of the year.

Drought Hits Contractors

The extremely dry weather throughout the eastern portion of the United States has worked havoc upon the completion of a number of paving projects. While usually a contractor welcomes a dry season which means that his subgrade will be in good condition and he will not be held up because of "wet grounds" many contractors who depended upon small streams for their water supply have found that the streams failed them completely.

While driving through Kentucky in early July, some road jobs were found to be completely shut down because there was not enough water in the creek to supply the paver and, on one of them, a subcontractor pouring headwalls was hauling water in oil drums a distance of 12 miles and carefully baling it out with a G. I. bucket for the small portable mixer he was using.

The latter part of July in Gettysburg, Pa., a contractor who was laying a waterbound macadam base for a bituminous top faced the difficulty of having to close down his operations entirely because of the very small flow in the one creek which crossed the job.

Those contractors who have been close enough to large streams to secure their water supplies, have been able to make remarkable progress on concrete paving jobs during the present construction season. Since 1924 and 1927, there has scarcely been better construction weather than this year, despite the excessive heat during the last two weeks of July.

Personal Contacts

Between the time these comments are written and the time they reach you, I shall have completed the third of my major trips during the present construction season. The first from the middle of May to the middle of June required rather intensive travel by automobile through Virginia, North and South Carolina, Tennessee, Arkansas, Missouri, Kentucky and West Virginia.

After three weeks of intensive work in the office, including several one-day trips to particularly interesting nearby projects, I started out on a tour of Pennsylvania, covering the major jobs in the very extensive program which is progressing so well as noted above.

One week in the office and now I am starting out to cover a number of bridge and grade crossing elimination jobs in Connecticut and several bituminous and concrete projects in the Bay Sate.

Thus far each one of these trips has been very productive of new ideas and methods picked up by discussing the work with the superintendent on the job and spending considerable time watching the operation of the various parts of the organizations and checking up on the equipment. The series of articles produced on the first southern trip has already begun to appear in Contractors and Engineers Monthly. I would call your attention to "A Well-Knit Paving Organization" describing the R. G. Lassiter & Co. job north of Lancaster, S. C., and an interesting dirt-moving article "No Change in Dirt Moving Methods?" between Centerville and Manassus, Va. A sand asphalt job was described in "Good-Bye Rakers — Finishing Machine Speeds Sand Asphalt Paving" telling of the work of Blythe Bros. Co., near Lumberton, N. C. An interesting side light on hand versus machine finishing of a concrete bridge was told in a portion of the article "Wood Forms for Square Balusters" telling of the work of the Hardaway Contracting Co., Columbus, Ga., on the Broad River Bridge near Columbia, S. C. The article "Management and Organization of a Concrete Slab Job in Tennessee" tells of the work of the J. L. Humbard Construction Co., near Bluff City, Tenn. Glance through this issue and you will find a lot more interesting projects described with a wealth of suggestions which you may be able to put to good use for your own organization.

"Coming Events"

Future issues will contain a number of articles describing unusual and well-organized jobs which I have visited on my trips this season among which will be "Two Complete Outfits on One Grading Job," describing the grading for a concrete road over entirely new location from Johnson City to Bristol, Tenn., and another article which should prove of interest to our readers is "Pennsylvania Contractor Tries Out 10-Foot Strip Construction," a Rudolph & Delano job south of Milford, Penna., on which the contractor adopted for the first time in the Keystone state the strip construction common to New York and New Jersey. I hope you will find them all interesting and profitable.

Theodore Reed Kendall

How the Other Fellow Did It

Construction Briefs

Digging and Concreting Foundations Without Footing Forms in Winter

38. An interesting job in Illinois handled during the winter made use of the frozen ground for forms while pouring pier foundations. Ordinarily it would have been necessary to employ a shovel to excavate the entire site. This would have necessitated backfilling after the forms for the piers were set and poured, meaning that all of the material around the piers would have to be handled twice. This would also mean, of course, that this material would not be nearly as solid as it was before excavating.

A vertical boom ditcher which cut straight down and could turn absolutely square corners, as well as dig the excavation with a perpendicular side was rented by the contractor. The operator cut a ditch 6 feet deep and 10 feet 4 inches long, then turned 90 degrees and dug 10 feet 4 inches, turned again and again until a rectangle was cut with outside ditch dimensions 10 feet 4 inches by 10 feet 4 inches, or the required size for one typical pier excavation. The ditcher was then through with that pier excavation and went on to the next. A crane with a clamshell bucket went after the dirt left in the center, measuring 8 feet 4 inches by 8 feet 4 inches by 6 feet deep and, even though the material was frozen to a depth of 2 feet, it was easy for the clamshell to handle.

Although the ground was badly frozen when the excavations were cut by the ditcher, there was no necessity for using salamanders. Excavation required about three weeks and during this period there was a severe change in the weather, during which the temperature moderated to such an extent that no difficulty was encountered as far as freezing of concrete was concerned. The same scheme was used for all 46 piers. 18.5.323

Disposing of Spoil Banks on Drainage Jobs

39. Fully 20 years ago an extensive drainage project was carried out near the Blue Hills close by Boston. A meandering stream flooded its banks on every storm, developing a swamp land which was a prolific source of mosquitos. To correct this, the channel of the stream was straightened and widened by a floating dredge which cast the excavated material on either bank. A novel method of disposing of this spoil was developed by placing a substantial centrifugal pump with a gasoline engine on a barge to supply an hydraulic giant which simply swept the material back from the shoreline levelling it quickly and effectively.

On a small development in Michigan, the contractor pulled a great many stumps from marshland in winter and had a small dredge operating piling up spoil banks. The methods of removing the earth from the stumps in the spring and summer and of levelling the spoil banks was quite similar to that described above. An old fire engine of the vintage of the early gasoline days was rigged up on a float of 2 x 12-inch planks with pontoons of old oil drums. This was moored to the bank of the lagoon and a 2½-inch hose with a 1¼-inch nozzle attached and a 4-inch suction used. The pressure at the nozzle was such that it could not be operated easily by one man, so a horse was rigged and the nozzle tied to it so that it could be manipulated readily by one man. With the layout the mass of earth, sand and mud confined in the roots piled on the shore was washed out and about 100 to 250 lineal feet of spoil was washed level per day. Where there was considerable sand, the material was left with a slight slope away from the bank of the lagoon so that rain would complete the work started by the high pressure stream. 19.2.79

A Home Made Scratch Template

40. All kinds of scratch templates are seen on road jobs. Some are merely wooden planks with spikes driven into the edge of the plank and others are more elaborate. An Illinois contractor used an I-beam supported by a two-wheel carriage on each form and hooked to the paver so that the whole unit moved as a single piece of equipment. The teeth for checking the subgrade were sharpened pieces of reinforcing steel held in place in holes drilled in the bottom flange of the I-beam by U-bolts. The scratch template was heavy enough to insure an accurate check and the teeth were readily adjusted for wear. 19.2.74

Cast Iron Pipe Joints Calked Pneumatically

41. On a 4,521-ton pipe line job in which 20-inch cast iron pipe was used, the contractor made up all of the joints with 2½ inches of lead in Class B pipe while in lighter pipe 2 inches of lead was used. All the joints that were made up of lead were calked pneumatically with air hammers. It was found that air-driven joints were far superior in tightness to those calked by hand. In this way as much as ⅛ to ¼-inch can be taken up over the hand-calked joints without danger of splitting the bells. Also, when large quantities of pipe are laid, such as was the case on this particular job, it becomes a necessity to calk the joints with air in order to keep up with the pipe-laying crew. A third section of this job was laid with a self-calking substitute for lead which was poured to a depth of 2½ inches. 18.5.307

Handling Canvas for Covering Concrete

42. On a Canadian concrete road job, as soon as the surface water had left the concrete the slab was covered with canvas squares as is common with burlap in many of the States. In this case, however, the canvas squares had ropes set in the corners of the squares to facilitate its handling. This is an item which might be well to consider for use in handling burlap. 19.2.56

Protecting Trucks at the Mixer on Strip Paving

43. It is quite common for contractors to protect their trucks from damage caused by running off the initial concrete slab onto the subgrade by using a short ramp placed close to the slab. A New York State contractor has devised another method which not only saves the subgrade, but actually makes it better, saves the tires of the trucks and eliminates all chances of broken springs.

A platform, measuring roughly 10 x 30 feet was made up of heavy planks and shod with sheet iron. The platform was placed between the forms or between the form and the concrete strip on which the trucks were running and was built about ½-inch less in thickness than the height of the forms. It had a wedge-shaped nose and was pulled with a wire cable and a crawler tractor. The tractor used was one which was employed on the fine grade and had a bulldozer attached. The grousers of the tractor cut the subgrade slightly but when the platform had been pulled ahead over the subgrade there was no sign of the grouser marks as the grade was planed perfectly smooth. Another advantage of the platform was that when the skip had dropped onto it to receive its batch and any of the batch was spilled it could be retrieved at once and without any chance of mixing the subgrade soil with it. 19.1.83

Building Activities Emerging from the Construction Depression

ACCORDING to the National Association of Building Trades Employers, American and Canadian builders feel definitely that building activities in practically all the large cities of both countries are steadily emerging from the construction depression of the last twelve months. There is a distinct confidence that a pronounced revival of all types of construction activities will commence early this fall. Reports from the builders reveal tranquil labor conditions are prevalent; wage scales are stabilized, with an absence of any concentrated effort on the part of labor to procure a 5-day working week. Before the present decline of building there was considerable agitation for the establishment of the 40-hour week. In several of the large American cities, builders report that the present volume of construction for this year promises to exceed the 1929 building programs.

New York is active in the rehabilitation work sponsored by the American Construction Council to remodel and rebuild the tenement districts in large American cities. Builders in New York state that their program lags behind that of 1929, but they report that there is sufficient building work in the home building line and in the large industrial types of building to keep resident building tradesmen employed.

Chicago builders predict that the second six months period of this year will see a revival of construction activities. To date it is estimated that fully 75,000 of the city's 115,000 building artisans and laborers are unemployed. The World's Fair buildings constructed within the next three years will exceed $40,000,000. Wage scales are stabilized for the next three years. Effort is being made by local builders to eradicate slum neighborhoods. Contractors state that the passage of the recent Traction Ordinance will develop a home building boom in neighborhoods affected by the adoption of the comprehensive traction plans.

There has been a building recession in Boston, Philadelphia, Washington and Pittsburgh, but the late reports from these eastern builders indicate a steady increase in construction. They believe, according to reports, that the decline in building has reached its lowest ebb and that the swing from now on will be on the up grade.

One of the most active building programs is in Cleveland where a large quantity of work has already been let to contract and to date there has been but a small decrease in the volume of construction for the first six months of 1930 as compared with 1929. Builders there believe that the 1930 program will exceed in volume the building of 1929.

Buffalo has large municipal contracts and builders are concentrating on smaller buildings which will bring up the average considerably.

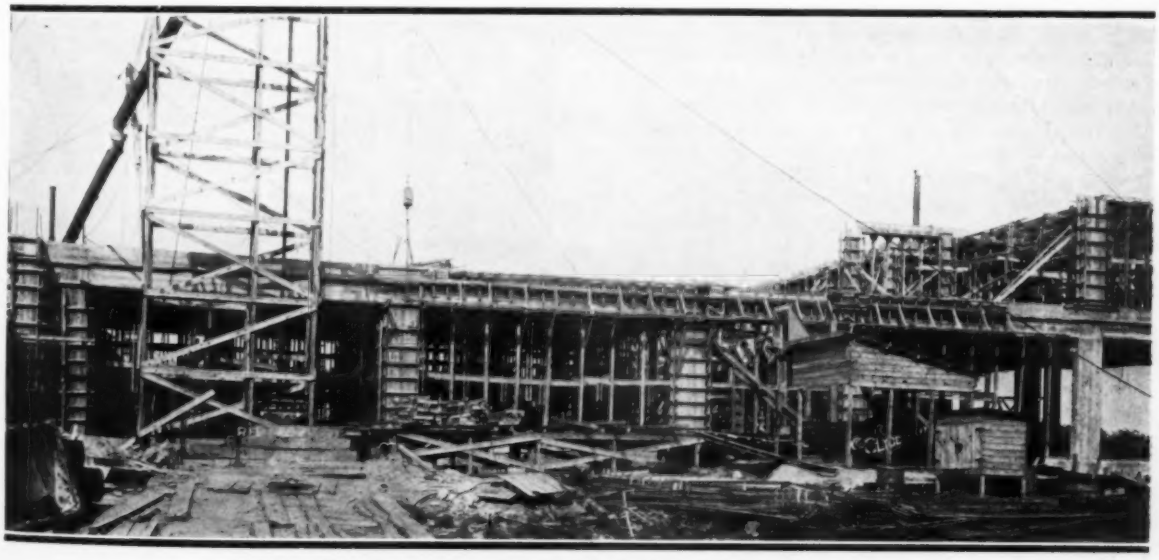
Dayton is swinging back to normalcy, with unemployment comparatively small. Erie has a program this year larger than 1929. New Haven has a very extensive program. In Louisville building is 123 per cent higher for the first six months of 1930 as compared with the same period in 1929. Ten million dollars in sewage contracts have been let in this city and unemployment is decreasing.

Richmond, Va., has a building activity greater than any period within the last two years. Loans are obtainable and employment in general is improving. Peoria, Ill., reports that present conditions are favorable. Toronto, Ont., reports that contemplated work is proceeding after the election. Public buildings are keeping the average up and there is not a great deal of unemployment. Vancouver has a fairly good program. Milwaukee has a good building program. Kansas City, Mo., has shown a valuation of building permits for the first 5 months of 1930 exceeding by approximately $2,000,000 the volume of construction for the corresponding period of 1929.

Building in Detroit dropped considerably during the first 5 months of 1930 and this condition likewise prevailed in St. Louis, Atlanta, Minneapolis, Indianapolis, Houston and New Orleans.

The Pacific Coast cities of Portland, Seattle, San Francisco and Los Angeles maintained a fairly active building program for the first 5 months of 1930 as compared with the similar period in 1929.

In Baltimore the construction valuation for the first 5 months of 1930 shows an increase of a little less than $2,000,000 over the first 5 months volume of 1929.



BUILDING THE WEST END HIGH SCHOOL AT RICHMOND, VA.

The National Construction Co., Atlanta, Ga., are the contractors for this project. The Clyde single-drum, 35-horsepower hoist, shown in the photograph as well as two DeWalt saws, a Humdinger pump, cable and other equipment, were purchased by the contractor from Ed. P. Phillips Machinery Co., equipment distributors of Richmond, Va.

International Trucks and Northwest Shovel Working in Big C. P. R. Cut in Saskatchewan

Day and Night Work on Big Railroad Grade Job

TO develop speed on his large railroad grading project, J. N. Pitts, contractor of Willipeg, working in Saskatchewan and Manitoba, operated on an all-power day and night basis. Pitts operated a fleet of some 30 motor trucks, including five 2-ton, one 2½-ton and several other International trucks.

Especially fast work was accomplished last season on a new 116-mile line for the Canadian Pacific Railway between Lanigan and Prince Albert in North Central Saskatchewan, and on a new 87-mile line between Melfort and Aberdeen for the Canadian National Railways in the same region of the province.

The new C. P. R. line passes through rugged bush country, and travel to various locations on the new line while work was being done was usually over rough makeshift trails. The cut shown in the illustration was about halfway between Prince Albert and Lanigan and some 20 to 30 miles from the town of Wakau on the Canadian National Railways. The cut was one of the biggest on the line, being 1,200 feet long, 20 feet deep and required the removal of 85,000 yards of dirt. The nearby fill was practically of the same length and 30 feet deep.

The Northwest shovel worked back and forth through the cut, speedily loading the trucks without any let-up in the operation of the shovel. While one truck was being loaded another was beside it, ready to get its load. In backing and dumping the fill, each truck was quickly maneuvered into position within a small place for unloading. The ability to back up to the very edge of the fill and dump in this manner, Pitts points out, gives motor trucks a great advantage over horses or mules and wagons, which must swing around the edge of the fill and on a slope to dump their loads. More time is required to maneuver into position to unload with horses and more work is required to level off the top of the fill. With motor trucks and one or two workmen to level the dirt the motor trucks are continually packing down a roadbed on which to travel on top of and to the very edge of the fill.

Until Pitts inaugurated his all-power system of dirt removal a year or so ago, much of the grading for railroads in this region was done with horses and wagons. Pitts claims that with five 2-ton dump trucks he was getting much more work done per hour than a contractor on a nearby stretch with 20 to 30 teams. Besides 10 hours of work a day was the maximum with the horses, while the motor trucks were working day and night. Trucks eliminated the problem of hauling hay and other feed stuffs which are required for 40 to 60 head of horses. The Imperial Oil Co., Ltd., with its wide-flung transport system to all parts of Canada, delivered all necessary oil and gasoline to each job where Pitts is operating.

Camps for the motor truck drivers and other workmen are maintained close to the jobs on which they are located. An expert chef is employed at each camp, and only the best of food is served to the men. Particular emphasis is placed upon the need of feeding the men well. Pitts says that nothing will help so much to keep the men happy and contented out in these lonely bush camps as plenty of high-grade well-cooked food.

Pitts is particularly proud of a job he recently completed on a contract for the Canadian National Railways between Woodridge and Baynham, Manitoba. By operating 7 of his trucks day and night he completed within a month the work of removing 120,000 yards of blow sand in which horses could not operate at all. It was necessary on this work to construct wooded grooved tracks on which to drive the trucks. He also had two other big fills for bridges which he completed within short periods of time by working his trucks day and night.

BULLDOZER AND GOOD SAMARITAN

At the bridge across the Northern Railroad of New Jersey track near the Morsemere Station, Ridgefield, N. J., fill was being trucked in and spread with a Caterpillar Sixty and bulldozer. Wet weather led to frequent miring of the trucks when the Caterpillars carried chain and cable and quickly snaked them out or ran its bulldozer up behind the wheels and pushed truck, load and all ahead. At times the operator even combined the operation of bulldozing and pulling out a truck as in the illustration

Movies Put Pep Into Safety Meeting

THE safety director of an Eastern construction company which employs about 2,500 men decided to try out the pulling power of a safety meeting that would be different. Accordingly, he scattered among the various job headquarters of the company over the state of New Jersey mimeographed programs of the meeting. These programs promised that there would be no speeches, but plenty of movies, a harmonica band and an accordian player. The program was to be completed with an opportunity for smokes, coffee and doughnuts.

Considering the fact that men were widely scattered, it was thought by the promoters that an attendance of 100 would make the meeting a decided success. Returns from the advertising began to indicate that the promoters were far too conservative. It was necessary to order more and more supplies to meet the demand, for 375 advance reservations were received. The total attendance was 452, or nearly 20 per cent of all the men among the widely scattered crews.

The safety movies that were given credit for the success of this meeting had been made the subject of careful study by this company. The company has used a number of different kinds of safety movies, but the most popular of these has been the movies made by the company on their own jobs. Following is their usual procedure for making these company movies:

They take a 16-mm movie film camera to a job, and without the knowledge of the man at work, they snap pictures of him working in an unsafe way. Then they take this man and instruct him in the proper method of doing this work. Again they take a picture of this man at work, this time observing approved safety principles. They explain to the man that when the picture is shown, a statement will be made indicating that he knows the safe way to do the job, but that he has been good enough to do it in the unsafe way for the benefit of other men who are doing like work. Thus, this man has entered the movies. He tells all of the other men about it, and he keeps after the safety representatives of the company until his own movie has been shown on that particular job. Thus, he becomes a decided booster for safety methods, and all of the workers on the job come to see the safety picture.

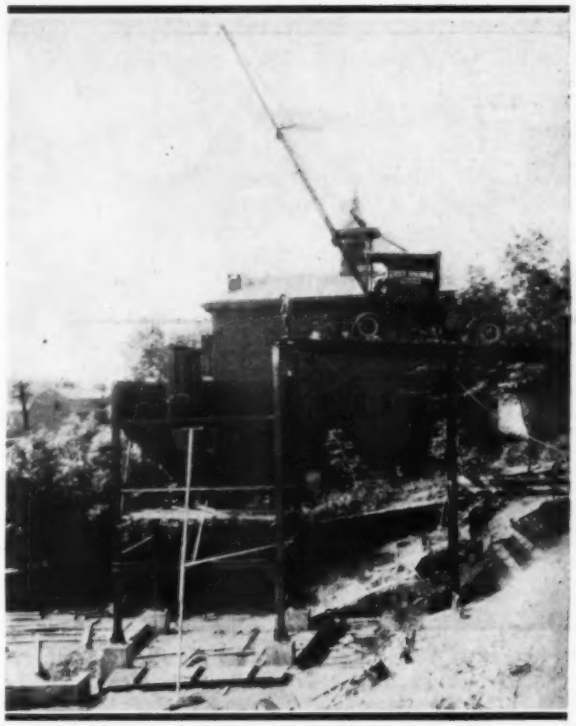
Officials of this company have summarized four especial values of movies in the promotion of their safety work.

1. Visible assimilation of the safety message is more rapid and lasting than auditory.
2. Safety movies carry their message to all workers regardless of their language.
3. Safety movies have an appeal that is possessed by few speakers.
4. Safety movies made by the company on their own jobs have an irresistible appeal to the men on these jobs.

The experience of this and other similar construction companies is being used in a national program for the reduction of accidents in the construction industry, through the medium of the Construction Section of the National Safety Council.

Crane Speeds Erection of Ready-Mixed Concrete Plant on Side Hill

THE Hartford Concrete Co., Hartford, Conn., wanted to install a sand and stone bin in its new ready-mixed concrete plant so that the sand and stone trucks could back in from one street level above and the trucks loaded with concrete leave on another lower street level. Because of this they picked out a side hill site as shown in the illustration. The actual erection of the ramp and bins was handled by a Universal crane operating from the upper level. One section of the ramp was erected, planked and the crane moved forward to erect the next.



Erecting a Batcher Bin with a Truck Crane

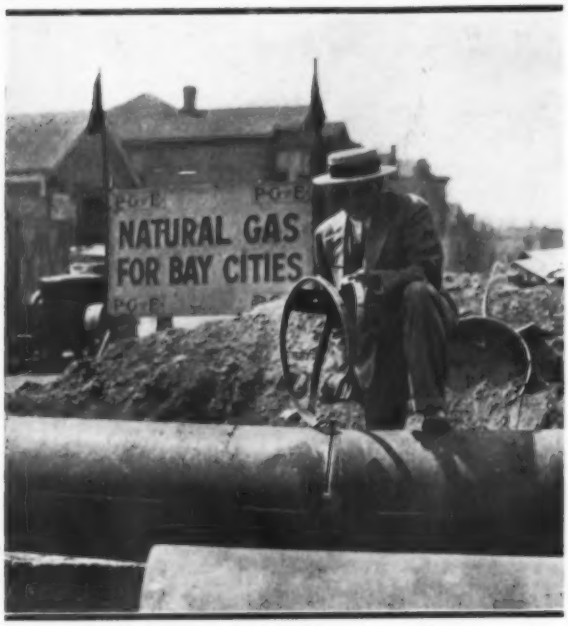
The man standing in front of the crane on the ramp is 60 feet from the ground. The job was completed in four days with two men, a foreman and a crane operator, which surprised the officers of the Hartford Concrete Co. and left a most favorable impression with them. The work was done by the Rodger-Sherman Transfer Co., of Hartford.

New Standards for Diamond Core Drill Fittings

NEW commercial standards for diamond core drill fittings which have been adopted recently are set forth in a pamphlet published by the Bureau of Standards. The aim of these new standards is to make diamond core drill fittings, such as bits, casing and rods, as produced by the various manufacturers, interchangeable in the field, in so far as controlling diameters, threads and dimensions of joints are concerned, and also to provide a convenient series of nesting casings, permitting three reductions in diameter below a 3-inch hole.

To insure that fittings actually are interchangeable, the manufacturers have adopted a carefully controlled system of gaging, made effective by working gages in constant use in the various plants. As a further safeguard to the user, and in order that he may know that the fittings he requires conform to the new standards, the working gages can be procured only through the Diamond Core Drill Manufacturers Association, and the Association has adopted an emblem to be attached to products made in conformity with the new standards.

This pamphlet "Diamond Core Drill Fittings" may be secured upon application to the Bureau of Standards at Washington; to C. H. Rohrbach, Secretary, Diamond Core Drill Manufacturing Association, 90 West St., New York, or to manufacturers of the fittings.



Type of Template Developed on the Pacific Coast to Facilitate Cuts for Bends in Pipe

Unique Template Makes Bends in Large Pipe Accurately

THE terminal section of a 20-inch oxwelded natural gas pipe line recently constructed by the Pacific Gas & Electric Co., was laid under city streets where frequent changes in direction necessitated the use of a great many 3-piece, 45-degree bends and 5-piece, 30-degree bends. The usual procedure for making a miter bend requires rotating one section of the pipe 180 degrees in order to match up the ends for the bend, but a different method was developed for this job, which greatly facilitated alignment and fabrication of the bends in the large diameter pipe.

A 22.5-degree gore was cut from a piece of 20-inch pipe and this became the template. It was cut in two at the widest part and a hinge was welded onto the two halves. Lug sections were welded onto the two ends to aid in maintaining the proper curvature of the template. The outside edges were beveled to facilitate marking the pipe. The center sections of the two halves of the template were cut out to reduce the weight and handles formed from pieces of welding rod were welded on as shown in the illustration.

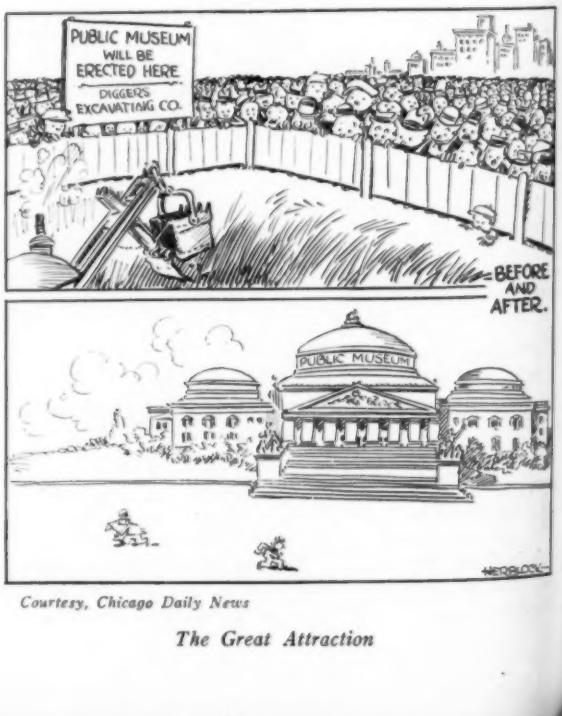
In making the cut with this template a section 6 inches long on the back wall of the pipe is left uncut which aids in maintaining correct alignment. When the cut has been made and the section removed the 6-inch uncut section in the back wall is heated with the blowpipe and the pipe is then bent around to the correct position without any lifting. A 45-degree bend requires two cuts and welds, a 90-degree bend, 4 cuts and welds. Spacing between cuts is determined by construction details, but wherever possible, long radius bends were used for this large diameter pipe. This type of template was used during the entire construction of the line, being very popular with the welders because of its convenient features.

Where, Oh, Where Has Production Gone

WHEN the driver of truck No. 6 is slow between plant and mixer, and the mixer waits 90 seconds for the batch he is delivering, that delay is easily forgotten at the end of the day in the search for the cause of a short day's production. The hose that comes loose and means a brief shutdown is not a very frequent offender and its role in the decreased production doesn't seem of much importance when the check-up is made each night but the slow truck, the loose hose, the bit of high subgrade and the endless list of other matters, none of great importance taken by itself, make up a total that may mean the difference between 1,000 feet and 1,200 feet of pavement in one day's run.

The Central Constructor reports that Booth & Olson, Inc. Sioux City, Iowa, during the course of paving operations in Boone County, has developed a simple but effective check on these delays. They have hired a young man who is wide awake and observant, whose sole duty is to stand at the mixer with a note book and a watch and record what he sees. His entries start at 6 A. M. and the second entry in his note book at 6:01 A. M. If a truck is slow he notes that truck's number, the exact hour and minute of the day and the length of time the mixer waited for its load. If the hose becomes disconnected he records the time of the enforced shutdown. If a high spot in the grade halts the forward movement of the mixer that appears in the book. The summation of the minutes and fractions of minutes at the end of the day makes instantly available the total amount of time lost and the explanation of that loss and thus the record accounts for any shortage in the day's production.

The effect of this observation is not only the knowledge of the delay causes, however. It actually results in elimination of many possible delays which would transpire without use of the system. The observer, accustoming himself to the measurement of short periods of time by frequently looking at his watch, noticed that the mixing cycle of the mixer seemed unnecessarily long. He timed it, and his checking resulted in the discovery of an easily remedied defect in the bell signal on the mixer which was permitting each batch to be mixed 10 seconds longer than specified. Men at the mixer do not regard the checker with an unfriendly eye. They consider him in the position of one of their own number, as anxious as any other member of the crew to turn out as large a day's production as possible. They have become keener themselves in watching for causes of delay. They are more than usually eager to hasten the repair of breaks and to resume operations after a shutdown, and they take pride in the fact that time check sheet at night does not attribute any delays to their own part of the operation.



Courtesy, Chicago Daily News

The Great Attraction

Legal Points for Contractors

These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney

Edited by A. L. H. Street, Attorney-at-Law

An Aid in Settling Disputes As to Price

"I said that I would pay you 55 cents per *cubic* yard for subgrading that street," insisted a street contractor in attempting to settle with a subcontractor.

"Your recollector must have become short-circuited or something like that," resisted the sub. "Our agreement was that you would pay me 55 cents per *superficial* yard."

When two chaps lock their horns in this manner there is always a chance for at least two lawyers to get part of the money, and each party fought for his interpretation of the contract, through the district court and on up to the Iowa Supreme Court. At the outset the parties saved the price of a piece of paper and a few drops of ink by having their agreement written on thin air instead of putting it down in black and white. But both of them paid heavily for their failure to put the agreement in indisputable form.

The judge or jury that tried the case probably thought that each one of the parties was as honest as the other and therefore there might have been a draw in this legal bout. But the attorneys for the general contractor won the decision by showing that from 50 to 60 cents per *cubic* yard was the going price for work of the kind done by the subcontractor, and the trial judge said that the evidence should be considered as tending to show the probability that the actual agreement was made on the basis of cubic yardage. Although it would have been equally open to the subcontractor to prove, if he could, that the price claimed by him was in keeping with the going price, it seems that he contented himself by objecting that the going price had nothing to do with the case, because there was an explicit agreement.

The Supreme Court adjudged (Goben vs. Akin, 227 N. W. 400, decided November 12, 1929) that the trial judge properly received evidence to show the going price for subgrading, not as a basis for directly fixing the amount to which the subcontractor was entitled, but merely as a fact showing a probability that the general contractor's version of the agreement was the true one.

A "Take It or Leave It" Proposition

There was a dispute as to how many days contractors had worked on a job, but none as to how much they were entitled to be paid each day actually worked. The owner gave them a check for a certain amount and wrote on the check a statement to the effect that the payment was in full to date. The contractors talked over between themselves whether they should accept the check or turn it back, and decided to cash it, which they did. Later they tried to collect an additional sum by suit, on the ground that the check was not drawn for as large an amount as it should have been drawn. But they lost their suit.

The Kentucky Court of Appeals said in this case (Alcorn vs. Arthur, 20 S. W. 2d, 276, finally disposed of October 18, 1929) that the contractors "sewed themselves up" when they accepted the check. I do not really mean that the court was so undignified as to say "sewed themselves up," but that, in plain English, is what the court meant when it said that acceptance of the check "constituted an accord and satisfaction."

A Little Slip That Cost Several Thousand Dollars

Just as surgeons occasionally boggle an operation by leaving a sponge, pair of pliers, or something else inside a patient, on sewing up an incision, it is no unusual thing for a bidder on a construction job to get himself into trouble through inadvertently overlooking one sheet of an estimate in arriving at a lump sum bid.

Let one who is apt to be careless or too hasty in casting up figures as a basis for a proposal take warning from the experience of the plaintiff in the case of Federal Contracting Co. vs. City of St. Paul, 225 N. W. 149. The company bid in a high school job at $146,000. A surety company refused to bond the contract, claiming that the bid was too low. In default of bond to secure performance of the contract, plaintiff's check for $4,500 filed with the bid, to secure entry into a contract, was forfeited and the job let to another bidder.

Two or three years later, the plaintiff awakened to a realization that his bid of $146,000 was made under a mistake arising from the fact that, in computing the bid, an estimate sheet totaling nearly $18,000 had been overlooked.

Denying the plaintiff the right to recover the $4,500 forfeited by the city, and referring to decisions in other litigated cases involving similar mistakes, the court said:

"In practically all the cases upon which the plaintiff relies there was a withdrawal of the bid or notice of the mistake was given before acceptance. Promptness is a suggested condition of relief. Good policy requires it. Without specifying the particular circumstances when relief will be given against a municipality for mistake, or when notice must come to it, or what delay will prevent relief, we are quite content to hold that when a preliminary contract was made as here, and breached because of inability to get a bond with no suggestion of a mistake for three years, the matter should be at rest."

Bidder Presumed to Understand What Plans and Specifications Disclose

A bidder who deposits a check or money to secure entry into a contract on acceptance of his bid must kiss the deposit good-bye, where he refuses to enter into the contract on the ground of some unexpected disadvantage, if his failure to discover it before bidding was due to his own neglect of opportunity to examine plans and specifications for the job. It was so declared by the Washington Supreme Court in the case of Eagle Livery & Transfer Co. vs. Lake Chelan Reclamation District, 283 Pac. 678, in an opinion filed January 2, 1930.

A successful bidder on construction work for a reclamation district sought to recover a $2,500 check deposited with the bid, on the ground of mistake in assuming that the job could be done by a hydraulic method. In denying a recovery, the court said:

"Appellant had access to the plans and specifications before submitting its bid and was fully conversant with their requirements, and these were amply sufficient to advise one skilled in that kind of work that such a method was not contemplated and could not be used, if the plain written terms were followed."

Legal Excuse for Repudiating Debts

Once in a while—with long intervals in between—one hears of a man who has paid a bill after it was outlawed or was discharged in bankruptcy. And then there is apt to be a difference of opinion as to whether he is entitled to respect. Probably most people will say that he was crazy to pay a debt that he was not legally bound to pay.

In any event the "woods are full" of debtors who will grasp at the faintest pretext for refusing to pay what they honestly owe, even when they have the means to pay. Some of these pretexts are almost amusing. There is a very common supposition that if a creditor calls a debtor up on the telephone and asks for payment of a bill that automatically cancels the debt. The same result is supposed to follow dunning a man on the street. And if the demand made by telephone or on the street happens to have been made on Sunday, the debtor is apt to regard his discharge from the debt as being doubly clinched, especially if he is a very religious man. But all these methods are within the law if the demand be made privately.

Creditors, however, should be careful to avoid giving publicity to the fact that a certain person is delinquent, especially where malice might be inferred. For example, it would be inviting a damage suit for a contractor to post in a conspicuous place a statement that a certain man owes him a certain amount and that the notice will remain posted until the bill is paid. The courts have held a suit for damages and injunction may be maintained against a creditor in such cases.

Sewer Contractor Held Not Liable for Flooding of Premises

Where an owner of property in a city prematurely and unauthorizedly made a connection with a sewer in the process of construction, and as a result of conditions incident to the construction work, his premises were flooded, the contractor was not liable. (Sisco v. City of Huntsville, 124 So. 95, decided by the Supreme Court of Alabama, October 10, 1929.)

When a Contractor Defaults

It is no crime for a contractor to refuse to carry out his agreement, although he may not have the least semblance of excuse for not doing so. His responsibility, or that of his surety or bondsman, is no more and no less than for the reasonable cost to the owner of doing the work that the defaulting contractor has left unfinished or of correcting defects for which the contractor is at fault. The same rule measures the damage that a general contractor is entitled to recover from a subcontractor, or the latter's bondsman, where the subcontractor has broken his agreement.

Naturally, this measure of damage takes into account the reasonable cost of securing material of the kind contemplated by the broken contract and the necessary labor to perform the job according to agreement.

Where a subcontractor is in default and the general contractor completes or corrects the work to conform to the broken subcontract no reason is perceived why the general contractor should not be permitted to recover, as part of the reasonable cost, a fair amount to cover the value of his personal services reasonably bestowed in doing what the subcontractor has left undone or in correcting what he has done defectively, and for wages of foremen, a superintendent, etc., as well as for the wages of laborers, etc.

In a Texas case, where a general contractor abandoned a job and the owner completed it, the Texas Court of Civil Appeals decided that the owner was entitled to reimbursement for the necessary services of an architect, although the defaulting contractor was an architect himself and would not have been put to that expense. (Watson vs. Dewitt, 46 S. W. 1061.) To the same effect see the New York case of Kinney vs. Massachusetts Bonding Co., 206 N. Y. Supp. 163.

In the case of White vs. Abbott, 74 N. E. 305, a subcontract provided that if the subcontractor should fail to carry on the work, and the owner should be compelled to complete it, expenses incurred by the owner should be deducted from the contract price. The Massachusetts Supreme Court held that this term "expenses" included a reasonable allowance to the contractor for arranging for and supervising the carrying on of the work after the subcontractor's default.

Where a contractor defaulted under a building contract with a school district, the district was upheld by the Wisconsin Supreme Court in demanding reimbursement for a fee paid a superintendent of the work after it was taken over on the contractor's having abandoned the job. (Joint School District No. 49 vs. Bailey-Marsh Co., 194 N. W. 171.)

A building was burned in the process of construction and the owner sued the contractor and his surety for failure to complete the job. The Mississippi Supreme Court said, in the case of United States Fidelity & Guaranty Co. vs. Parsons, 112 So. 469, 474: "In a suit against a surety and contractor to require performance of a building contract where the building was to be completed, and the performance of the contract was guaranteed by the surety company, and there was a breach of the contract on the first building being destroyed, the contract was thereby breached, and reasonable fees for the supervision of the construction of a new building are allowed. (9 C. J. 815 et seq., and authorities there cited.) We think also that loss of rents by the owner should be recoverable for such reasonable time after the time the building should have been completed under the contract, as will permit the owner to complete the building, provided he does so promptly, and within a reasonable time."

Accidents on Unfinished Highways

The Law requires every man to "use his head." If he knows of a condition that creates some personal danger, he must govern himself accordingly.

The Missouri Supreme Court applied this principle, in favor of a highway contractor, in the case of Sheffer v. Schmidt, 26 S. W. 2d, 592, finally disposed of April 2, 1930.

Sheffer, in driving along an unfinished road embankment after dark, knew that it stopped short of an unfinished bridge, and yet he was driving 20 or 25 miles an hour when he reached that point. He steered to one side down the embankment and was injured in running into a bank. In deciding that he was not entitled to recover damages from the contractor, the court said:

"We do not think that the obstruction or defect in the roadway here in question, and known to plaintiff, was of such a nature as to render its use necessarily dangerous to a person ordinarily careful, or such that an ordinarily prudent person would not have attempted to pass over in the night-time in an automobile with good brakes, and headlights in good order. But plaintiff's knowledge required him to exercise the reasonable care of an ordinarily prudent person. . . .

"He knew . . . that he would be obliged to drive down the side of the embankment to the low ground below, and he was expecting to do that; yet he did not so control the speed of his car that when he saw the detour down the side of the embankment was necessary, he could control the speed of the car in going down the embankment, and its movement over the ground below."

For another decision to the same affect, in a similar case, see the decision of the Kansas Supreme Court filed January 11, 1930, in the case of Tuer v. Wayland, 283 Pac. 661.

Construction Industry News

The Wire Reinforcement Institute, National Press Building, Washington, D. C., has been formed by the manufacturers of welded wire fabric reinforcement to provide a centralized organization to exploit the technical and utilitarian merits of wire used for concrete reinforcement. Sponsored and supported by the several companies engaged in the manufacture of welded wire fabric, yet wholly independent of the commercial interests of any single manufacturer, the Institute will function as a purely promotional organization, its activities including the assembly and dissemination of authentic information, data and statistics relevant to welded wire fabric and its many uses.

Trackson Co., 500 Clinton St., Milwaukee, Wis., has recently announced the appointment of the Millsap Road Machinery Co., 23rd St. and 23rd Ave., Birmingham, Ala., as a new distributor of Trackson tractor equipment in the Birmingham territory.

Stuart R. Ives, Vice President and General Manager of the Lyle Culvert & Pipe Co., Minneapolis, Minn., has been appointed General Manager of the Armco Culvert Manufacturers' Association, with headquarters at Middletown, Ohio. Previous to his joining the staff of the Lyle Co., he was connected with the American Rolling Mill Co. for 13 years, 10 years of which were spent in the Culvert and Flume Dept.

Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago, Ill., has announced the opening of a branch sales office at 6200 East Slauson Ave., Los Angeles, Calif., where a complete line of Thor electric and pneumatic tools and spare parts will be carried in stock. Vernon Job, formerly Manager of the San Francisco office, will be in charge of the Los Angeles office, assisted by B. J. Herron. The appointment of C. T. Connelly as Manager of the Buffalo office of this company has also been announced.

American Tractor Equipment Co., Oakland, Calif., has announced the recent appointment of Homer L. Guiler as District Representative in the Northwest for Ateco earth-moving equipment. Mr. Guiler for the past four years has been associated with Hofius-Ferris Equipment Co., Spokane, Wash., previous to which he was affiliated with the Connelly Machinery Co., Billings, Mont., and the Northwest Equipment Co., of Butte, Mont. The territory which Mr. Guiler will cover includes the states of Oregon, Washington, Idaho, Wyoming, Montana, Utah, North Dakota, South Dakota and Minnesota.

Universal Atlas Cement Co., Chicago, Ill., has recently appointed C. A. Webb as District Sales Manager in charge of the Chicago district, to succeed W. L. Greenly, who has been transferred to the general sales office. Mr. Webb has been associated with the company for 13 years.

John H. Barker, representing the LaBour Co., Inc., of Elkhart, Ind., in the New York territory, has recently moved his office to the Tribune Building, 154 Nassau St., New York City.

Chain Belt Co., Milwaukee, Wis., has announced the appointment of the following distributors: The Equipment Corp. of Arizona, Phoenix, Ariz.; F. C. Crane Co., Dallas, Texas; Joe C. Tucker, Morganfield, Ky.; Track-Type Tractor & Equipment Co., Amarillo, Texas; and Concrete Products Co., Oakland, Calif., all of whom will handle the complete line of Rex construction equipment. In addition, the Chain Belt Co. has appointed E. C. Atkins & Co., Inc., Memphis, Tenn., as chain and power transmission representatives.

Hercules Powder Co., Wilmington, Dela., has announced that Charles B. Spicer, Resident Manager of the St. Louis office of the company, has retired after 43 years of service in the explosives business. Mr. Spicer has been associated with Hercules since 1913.

The Foote Co., Nunda, N. Y., has announced the appointment of the G. E. Lowe Co., Chicago, Ill., as general distributor in the north central territory, extending from western Michigan to Nebraska and from Kentucky to the Canadian border. The office of this company is located at 612 North Michigan Avenue, with the warehouse for mixer repair parts and service at 2811 West Fulton St., Chicago.

Joy Manufacturing Co., Franklin, Pa., has announced that William H. Searight, for several years with the American Gas Accumulator Co. as Western Manager, has recently joined the staff as Assistant Sales Manager in charge of snow loading and surface material handling development.

Genfire Steel Co., New York, has recently announced the appointment of Paul R. Clark, formerly President of the Fireproof Products Co., as New York District Manager. Mr. Clarke was Sales Manager of the General Fireproofing Co., Youngstown, Ohio, before becoming affiliated with the Fireproof Products Co.

The Fate-Root-Heath Co., Plymouth Locomotive Works, Plymouth, Ohio, has announced that John H. Neafie, formerly associated with George H. Fanning under the name of Neafie & Fanning, 50 Church St., New York, has acquired Mr. Fanning's interest in the partnership. He will continue under his own name to represent the Fate-Root-Heath Co. in New York and New England with new and larger quarters at 115 Broad St., New York.

Contractors Machinery Corp., Batavia, N. Y., has announced that Samuel J. Hunt, formerly Sales Manager for Wiard Plow Co., has assumed the duties of Vice-President and General Manager of Sales. The newly-organized Contractors Machinery Corp., will manufacture and sell Trojan tractor equipment and contractors' tools, including grade rippers, automotive revolving scrapers and stone spreaders, as well as rebuilt power units such as shovels, cranes, rollers, compressors, etc.

Link-Belt Co., 910 South Michigan Ave., Chicago, Ill., has recently appointed William Piez, brother of Charles Piez, Chairman of the company, as European correspondent. Mr. Piez, who resigned his position as District Manager of the Concrete Steel Co. of Chicago in September, 1928, has lived in Paris since that time. His duties will keep him traveling the greater portion of the time, but he can be reached in care of the Hotel Lutetia, 43 Boulevard Raspail, Paris, 6E, France.

Lima Locomotive Works, Inc., has recently moved its New York offices to the Lincoln Building, 60 East 42nd St.

The Bulletin Board

New Lines Carried by Distributors of Construction Equipment

D. S. Meadows Co., Inc., 19 Church Ave., E., Roanoke, Va., has recently added the General Excavator Co., Marion, Ohio, to its accounts.

J. I. Bingham, 110 Walnut St., Elmira, N. Y., has recently been appointed local representative for the Mohawk Asphalt Heater Co., Schenectady, N. Y.

Ohio Valley Truck & Equipment Co., Marietta, Ohio, has added the Wehr Co., Milwaukee, Wis., to its accounts.

Truck & Tractor Equipment Co., Ltd., 961 Queen St., E., Toronto, Canada, has recently been appointed distributor for the General Excavator Co., Marion, Ohio.

Yancey Bros., Inc., 634 Whitehall St., S. W., Atlanta, Ga., has added the line of Cedar Rapids crushers, gravel plants and pre-mix plants made by the Iowa Mfg. Co., Cedar Rapids, Iowa, to the lines previously handled.

H. O. Penn Machinery Co., 140th St. and East River, New York City, is now handling Buhl air compressors, made by the Buhl Co., Chicago, Ill., in addition to its other lines.

Tennessee Tractor Co., 205 Fourth Ave., S., Nashville, Tenn., has recently added the General Excavator Co., Marion, Ohio, to its accounts.

Miller Equipment Co., Inc., 127 Solar St., Syracuse, N. Y., has been recently appointed distributor for the Wehr Co., Milwaukee, Wis.

C. M. Conant Co., 182 Broad St., Bangor, Maine, has added the Cleveland Rock Drill Co., Cleveland, Ohio, to its accounts.

Shearer & Mayer, 712 W. 13th St., Indianapolis, Ind., is now representing the General Excavator Co., Marion, Ohio, in addition to the lines previously handled.

Badger Tractor & Equipment Co., 35 25th St., Milwaukee, Wis., is now distributor for Cat wagons manufactured by the Davenport Locomotive & Mfg. Corp., Davenport, Iowa.

C. H. Loomis & Co., 304 Jelliff Ave., Newark, N. J., is now representing the DeWalt Products Corp., Lancaster, Penna., in addition to the lines previously handled.

Roy C. Whayne Supply Co., 8th and Main Sts., Louisville, Ky., has recently been appointed distributors for Chicago automatic conveyors, manufactured by the Chicago Pneumatic Conveyor Co., Cicero, Ill.

J. B. Harbison Equipment Co., Little Rock, Ark., has recently been appointed distributor for the General Excavator Co., Marion, Ohio.

Engels Tractor Co., Inc., 334-336 N. Genesee St., Utica, N. Y., whose card appears this month for the first time in the Dealers' Directory of CONTRACTORS AND ENGINEERS MONTHLY, is distributor for P & H shovels, made by the Harnischfeger Sales Corp., Milwaukee, Wis.; Monarch-Allis Chalmers tractors, manufactured by the Allis Chalmers Mfg. Co., Monarch Tractors Div., Milwaukee, Wis.; FWD trucks, a product of the Four Wheel Drive Auto Co., Clintonville, Wis.; Cedar Rapids crushers and washing equipment, made by the Iowa Mfg. Co., Cedar Rapids, Iowa, and other construction equipment.

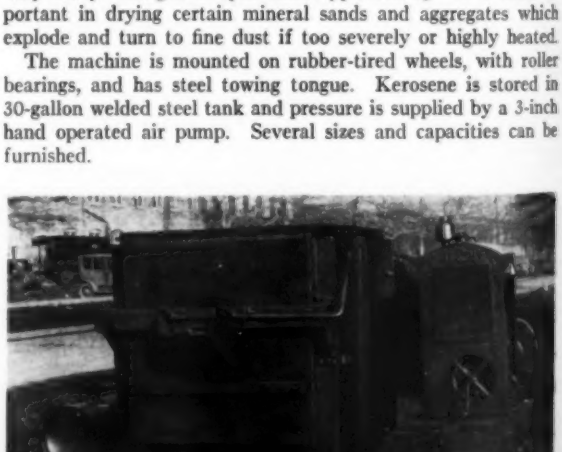
Additional information in regard to the lines carried by Distributors may be found in the Directory, pages 123 *to* 150 *of this issue of* CONTRACTORS AND ENGINEERS MONTHLY.

A Portable Sand Drier or Asphalt Mix Reheater

A NEW type portable sand drier or reheater for paving mixes has been announced by the Chausse Oil Burner Co., Elkhart, Ind. This machine has been developed to meet the necessity for rapidly heating and drying sand or stone for railway and contractor's uses, or for reheating premixed and natural asphaltic paving repair materials. It consists of a rotating drum with internal cascading blades mounted on SKF self-aligning ball bearings and enclosed in a steel housing. The drum is turned by a LeRoi single cylinder, 4-horsepower, radiator cooled engine, with Twin Disc clutch and Cotta reducing gear, through hardened roller chain.

An important feature of this machine is the indirect application of heat. It is equipped with two Chausse self-generating kerosene burners, located with the steel housing underneath the rotating drum. These apply the heat effectively on the outside of the drum and no high temperature flame comes into contact with the drying or heating materials. This is especially valuable in handling bituminous mixes which can be very easily damaged in open flame type heating. It is also important in drying certain mineral sands and aggregates which explode and turn to fine dust if too severely or highly heated.

The machine is mounted on rubber-tired wheels, with roller bearings, and has steel towing tongue. Kerosene is stored in 30-gallon welded steel tank and pressure is supplied by a 3-inch hand operated air pump. Several sizes and capacities can be furnished.



The New Chausse Portable Drier and Reheater

The Bulkometer for Testing Moist Sand. At Right, Cylinder in Its Carrying Case; Center, Filled with Moist Sand and at Left, Inundated Showing Reduction in Volume of Sand

A New Device to Test the Bulking of Sand

THE effect of moisture in producing the bulking of sand is well known. Where concreting operations are carried out on a large scale, uniformity of proportions is obtained by some sort of inundating device. On many operations, however, an inundator is impractical and in these cases correction in sand content because of bulking must be largely a matter of guess work.

In the following table prepared from data taken from figures in a booklet published by the National Crushed Stone Association, there is given a comparison between what the mix should be and what it actually is with moist sand:

VARIATION IN GUNCRETE AND CONCRETE PROPORTIONS IN BULKING OF SAND

		Guncrete Proportions	Concrete Proportions	Concrete Proportions
0.....	0	1-3	1-2½-5	1-2-4
1.....	7.5%	1-2.79	1-2.32-5	1-1.86-4
2.....	15.0	1-2.61	1-2.17-5	1-1.74-4
3.....	23.0	1-2.44	1-2.03-5	1-1.62-4
4.....	29.0	1-2.33	1-1.94-5	1-1.55-4
6.....	28.5	1-2.33	1-1.94-5	1-1.56-4
8.....	27.0	1-2.36	1-1.97-5	1-1.57-4

In cement gun work, sand is used in a relatively dry state and in order to facilitate tests for the bulking of sand, the Cement Gun Construction Co., 537 So. Dearborn St., Chicago, Ill., have devised a Bulkometer. This has been tested by the Portland Cement Association and found to be accurate to within practical limits. It is simple in operation and a bulking test can be made of sand in a very few moments without requiring special skill or training.

New Road Form Makes Accurate Preparation of Grade Unnecessary

A NEW steel road form manufactured by George O. Harm Co., Warren, Ohio, has as its aim, the elimination of the painstaking and expensive task of accurately preparing the grade to receive the road forms. In using this Uni-Grade form, it is only necessary to carry the grade to within 3½ inches of the true grade. Then, after the grade has been thoroughly rolled, the forms may be set and brought to the proper position by the wedges.

Tests recently conducted on several contracts have shown that four men can set, line and grade 250 feet of this form an hour. The form is set in the following manner. The rails and pedestals, which are the feature of the form, are first strung out and then a pedestal is engaged under the end of each rail and set as close to the line as possible. After the stakes have been driven, the wedges are moved one way or the other until the rails are at the proper line and grade, there being a 3½ vertical and 1½ lateral movement possible. The center pedestals are then placed under the rails, the stake driven, the wedges tightened up and the forms are ready for the concrete.

The rail itself is simple in construction with a rolled top and three vertical stiffeners for each 10-foot length which are slotted to receive the pedestals. The pedestals have two wedges to permit lateral adjustment and one to permit vertical adjustment of the pedestal to conform to the grade and to support the rail at the proper elevation. The use of the pedestal prevents any tipping or rocking motion of the rails. The rail weighs about 75 pounds per 10-foot length and the pedestals about 30 pounds each.

Self-Priming Centrifugals

ON many pumping jobs where the ordinary centrifugal pump requires constant attention to keep it primed, a Barnes self-priming centrifugal, made by the Barnes Mfg. Co., Mansfield, Ohio, requires no more attention than starting the motor and keeping it in fuel and oil.

The self-priming unit of this pump is simple and built for years of hard service, requiring no attention other than the addition of a small quantity of oil to the air pump about once a week. The air pump has but one moving part and that runs in a bath of oil.

Barnes centrifugal pumps are made to deliver a variety of capacities per minute. Fluctuating water level or leaky suction line does not stop the pumping as the air that leaks into the line is exhausted automatically several times a minute. It is self-priming on any suction lift up to 27 feet. No foot valve is required on the suction hose. On the discharge side of the pump a simple flap valve is provided to seal the line while the air is being exhausted from the suction line by the self-primer. The pump has few parts, is compact, light in weight and ruggedly built, and is easily portable.

A Ford Utility Truck Belonging to the Duval Engineering & Contracting Co., Jacksonville, Fla., Equipped with a Complete Smith Welding Outfit, Spare Parts, Brake Lining, Etc. A Real Trouble Chaser

More Work from Chain Drives

By Charles R. Weiss

Chief Engineer, Link-Belt Co., Indianapolis, Ind.

TO make your chain drives last longer, there are just 5 simple things for you to do. Note the sketches illustrating each point.

"First—proper alignment. Be sure that sprocket wheels are in line on the shafts, as shown in Fig. 1. If the sprockets are not exactly in line, a side pull develops which concentrates the load on the side of the sprocket teeth, and on one side of the chain. This faulty alignment results in excessive wear on both chains and sprockets.

"Second—proper adjustment. The chain should be run just a little slacker than a belt—about as shown in Fig. 2. Too much tension causes undue wear on the chain, and wasteful friction on the bearings. Not enough tension, of course, may allow the chain to jump the sprockets or ride the teeth and break.

"Third—frequent lubrication. The chains should be lubricated at frequent intervals. A good grade of light cylinder oil should be used. A paint brush is a good thing for applying oil to the chain joints, as indicated in Fig .3. Paint the open joints on the open (upper) side. Oil the closed joint chains on the inside (upper side of lower run) while the drive is running slowly.

"Fourth—frequent cleaning. Open drives should be cleaned regularly. Take the chain off, and clean it well by soaking and dipping in kerosene, see Fig. 4. Dry well, and oil it thoroughly before starting up again. Before shutting down a machine for a period of time, clean the chain, and oil it with heavier oil or grease. When it is to be used again, re-clean and oil with light oil.

"Fifth—well-fitting sprockets. Last, but not least, look at the sprocket wheels from time to time to make sure that they are not worn enough to injure the chain. Before the teeth are worn to a hook shape, as shown in lower illustration of Fig. 5, the wheels should be replaced with accurately made and close-fitting sprocket wheels."

By giving only ordinary attention to your chain drives you make them last longer and run better, and also reduce the chances of a breakdown.

If these recommendations are followed you will be time and money ahead and will get the best wear and service out of your machinery.

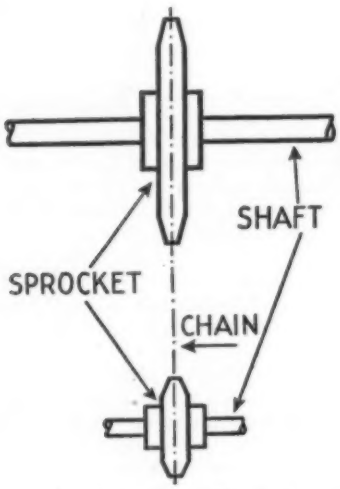


Fig. 1.—Proper Alignment

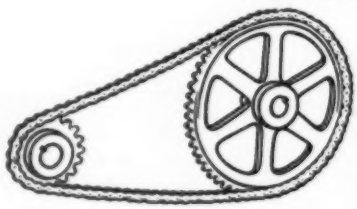
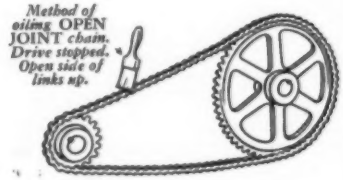


Fig. 2.—Proper Adjustment



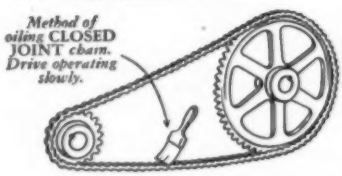


Fig. 3.—Frequent Lubrication

Fig. 4.—Frequent Cleaning

Fig. 5.—Well Fitting Sprockets

Steel Forms for Concrete Road Work

ROAD forms which are made from the best quality 3/16-inch ingot steel in 10-foot sections, with a full 6-inch base giving 5 square feet of bearing surface to each section, are manufactured by the Hotchkiss Steel Products Co., Binghamton, N. Y. Each section of the Hotchkiss Super road form is reinforced at both ends and at five other points along the section, giving sufficient vertical strength to the form as well as taking care of the vibration or flexing of the form caused by the oscillation of the finished machine.

In these forms holes are drilled in the top of the flange of the rail for integral curb construction, spacer angles and so forth and in the bottom flange for bolting on lift strips for increasing the height of the form. All movable parts with the exception of the stakes are made integral to the form, making it easy to install or to move from one job to another.

The sections are fastened together by means of a locking slide on the end of one section which fits into the adjoining end of the next section, a guiding wedge of steel on each form elevating the slide and bringing the form into perfect alignment as well as reinforcing both flanges of the forms and making the joint the strongest part of the form.

The captive locking wedge, made of one piece of 3/16-inch steel is retained at all times in the stake pocket without bolts, rivets or cotter pins, holding the form at any elevation on the stake. The stakes are carbon steel and are hardened.

The Ariel Dam project, located on the Lewis River in the State of Washington, is interestingly described in an article which will appear in the September issue of CONTRACTORS AND ENGINEERS MONTHLY. *This project will provide for the maximum storage of* 220,000 *acre-feet of water and will cost approximately* $8,500,000.

A New Truck-Mounted Mixer

AFTER two years of experimenting in the field with the various types of agitating and mixing bodies the Chain Belt Co., Milwaukee, Wis., has designed the Rex Moto-Mixer, a highly portable light weight body built to fit any make of truck. The body is mounted low on the supporting frame with a large charging opening, a variable flow discharge chute, an independent easy-turning drum with three-point anti-friction suspension, thus making it a self-contained unit with its own power plant and power take-off.

The drum is driven by a Rex Chabelco chain. The transmission is fully enclosed and operates in a bath of oil and the water is the same standard system that is used on all Rex mixers.

A Rex Moto-Mixer Discharging Directly into the Forms

A Portable Gravel Plant

A NEW trailer type screening, crushing and loading plant, designed to be moved about by the road contractor or others engaged in road making by means of a truck or tractor, has recently been added to the line of mounted crushers and portable sand and gravel plants manufactured by the Good Roads Machinery Co., Kennett Square, Penna. The function of this plant, which is known as Model Y-90, is to receive the run of bank gravel and crush the over-size boulders to the desired specifications. The crushed gravel along with the sand is then loaded by the conveyor to the trucks for delivery to its destination.

The arrangement of the equipment by the use of the closed circuit feature insures that only gravel of the desired size shall be fed to the trucks. The capacity of the plant, based on a pit run of 25 per cent over 1-inch material to be crushed is 300 to 350 yards per day of 10 hours, with a single deck screen and without any rejection of excess sand.

Power can be furnished by either a gasoline engine or an electric motor, or by a tractor of sufficient power. The plant can also be arranged for a short center V-belt drive if desired.

The superstructure is of heavy structural steel, with a platform and hand rail provided for the operator from which he can watch the operation, and all the control levers are within easy reach of this platform. The chassis is heavy structural steel frame securely riveted and braced, and is carried by two heavy steel axles. The front axle is pivoted to provide 3-point suspension and equipped with ball bearing fifth wheel. To the rear of the crusher is mounted a liberal-sized tool box.

The crusher used in this plant is a Champion roller bearing fine reduction crusher, equipped with SKF self-aligning roller bearings. A clutch is provided to cut out the entire mechanism except the crusher, which starts with the power unit. The screen is the 'Good Roads" vibrating screen, the screening action of which is obtained by means of an eccentric shaft rotating at high speed and imparting to the screen surface a vibrating and self-cleaning action.

The Model Y-90 Crushing and Loading Plant

The plant is intended to be fed by means of a portable belt conveyor, which in turn is loaded by means of a drag scraper, crane or shovel. A crane, dragline or shovel with sufficient reach could feed directly onto the grizzly over the vibrating screen. The portable conveyor is not part of the standard equipment, and should be not less than 18 inches x 44 feet long and equipped with its own power. After the material is dropped on the grizzly the large boulders roll directly to the crusher and the undersize to the vibrating screen. This passes the sand and smaller sizes of gravel to the hopper below and the plus sizes pass to the crusher. The oversize gravel leaving the screen and grizzly falls into the crusher, is reduced to the desired size and falls onto a short belt feeder, which in turn passes the crusher product to the elevator. The elevator raises the crushed gravel to the vibrating screen again.

Under the vibrating screen is a steel hopper, 1½ cubic yards in capacity, which is fitted with a discharge gate controlled from the operator's platform. The gate discharges onto an outboard loading conveyor, which is mounted on a light structural steel frame and is suspended by means of a steel ball and chain from the chassis with a removable pin.

For transporting the plant, the upper part of the elevator and the chute to the grizzly is pivoted so that it can be folded into a horizontal position. This is readily raised in place again by a simple chain-hoisting arrangement.

REBUILDING DOUBLE TROLLEY TRACK WITHOUT INTERRUPTING SERVICE

A Bay City shovel equipped while a special short boom and dipper handle working under low clearance trolley wires in Brooklyn, N. Y., rebuilding a double track trolley line. The shovel is removing the old bricks, ties and concrete while the trolley service continues without delay on the parallel track

A 100-Gallon Asphalt Kettle

Tar and Asphalt Melting Kettles

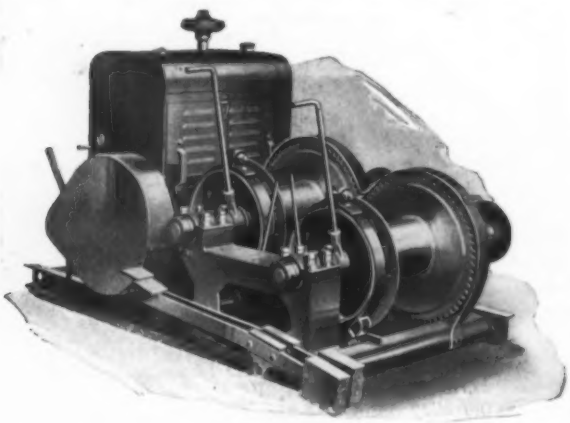
THE Hauck tar and asphalt melting kettles which burn kerosene, coal oil or light furnace fuel have been designed by the Hauck Manufacturing Co., 149 Tenth St., Brooklyn, N. Y., for municipal, county and state highway maintenance officials, paving contractors, roofers and waterproofers.

They are simple in operation. After filling the fuel tank a few minutes pumping will produce from 20 to 35 pounds pressure or sufficient to operate burner and kettle continuously for several hours, the air being used only to force the fuel to the burner. When the pressure becomes low, a few strokes of the pump raises it sufficiently for several hours' operation. The burner should be preheated for 5 minutes and the equipment ready for operation, producing hot asphalt 10 minutes after starting the burner with a continuous flow thereafter.

The design and construction of the kettle permit high speed trailing without damage to the trailer, and hard usage. The Hauck straight flame burner, the result of 29 years of oil burner experience, reduces clogging and carbonization to a minimum. The heater coils are made of dead soft annealed seamless steel tubing pickled to remove the scale. It is easy to keep clean and in working order and any part of the burner can be quickly replaced, making it unnecessary to buy a new burner simply because a new part is needed.

Gasoline or Electric Powered Hoists

A NEW line of gasoline or electric powered hoists in seven sizes, ranging from 2 to 27-horsepower, has been announced by the Dake Engine Co., Grand Haven, Mich. Following the usual Dake design, the side frames which support the shaft bearings and the base are made in one piece. In the five sizes up to 20-horsepower, the frame is made entirely of steel, electric arc welded. The steel channels, which are the side members of the base, serve as skids and are drilled for holding down bolts and anchor chains. The cross members of the frames are angles and tubes. The hoisting drums with ratchets and brake drums are also of one piece electric arc welded steel construction.

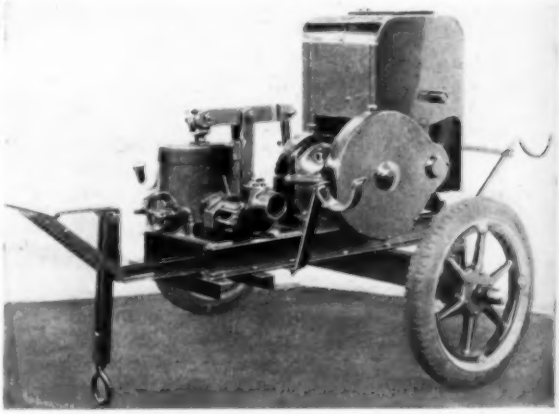


A Dake Hoist

Bronzed bushed cams running on the drum shaft engage the friction clutch and two ball thrust bearings minimize the operating lever pull and carry the clutch throw-in forces which act in compression on the one side frame. A drilled and keyed collar takes up the wear of the wood friction blocks and adjusts the end movement of the drum.

The brakes are of the band type with one fixed end, the bands being made in two parts and fastened together with an adjusting bolt conveniently placed on the top of the drum. They are operated by a rocker and lever, so that the brakes are smooth, positive and applied with a light pedal force.

The 20 and 27-horsepower sizes have cast frames and Timken tapered roller bearings on all power shafts, the bearings carrying both the radial and thrust loads. To meet the varied demands for small power hoists, these Dake LG hoists are standard with either gasoline or electric power units and each size is made with a choice of three standard loads and speeds.



A Novo Roller Ring Pump Mounted on a Two-Wheel Rubber-Tired Trailer

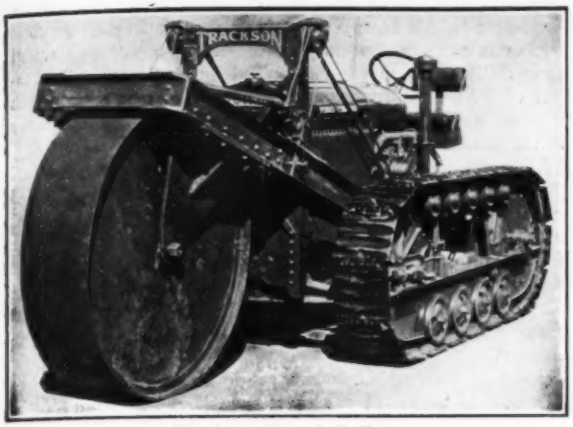
A New Principle in Pump Design

AN entirely new principle in the design of pumps for contractors, public utilities and others having dewatering problems has been introduced by Novo Engine Co., Lansing, Mich., in its new roller ring plunger pump, which is new in principle, design and performance.

An absolutely liquid tight water seal is maintained by two rubber rings on the plunger that roll with the action of the piston as they are pressed against the cylinder wall. The rolling action of these rings minimizes friction and hence reduces wear permitting the use of one set of rings for a season's work without a change.

Due to the rapidity of the strokes of the plunger, which operates at 100 strokes per minute, water is forced through the pump at a very high velocity, permitting it to carry along with it a great deal of foreign material held in suspension. This is also facilitated by the fact that it is a straight line flow from the suction inlet to the discharge.

The pump is compact and light, the pump itself weighing only 90 pounds. It has a capacity of 3,500 to 5,000 gallons per hour and develops a 100-foot head. For high speed hauling it may be mounted on a coil spring rubber tire trailer. Its standard mounting is a four-wheel truck.



The New Trench Roller

A Trench Roller

AN interesting recent development in construction equipment is the new Trackson trench roller, made by the Trackson Co., 500 Clinton St., Milwaukee, Wis., which provides a simple, effective and economical method of packing down dirt over newly-laid cable, conduit or pipe lines. It is finding favor with city officials, public utility superintendents, engineers and contractors because it eliminates hand tamping and puts back all of the dirt.

The roller is built for mounting on the Model DH Trackson McCormick-Deering crawler tractor. It consists of a wide steel roller, filled with concrete and weighs from 3,000 to 4,000 pounds, the weight varying to meet the requirements of different soil conditions. The wide crawler tracks of the tractor easily straddle the trench, and their low ground pressure, of less than 4½ pounds per square inch, eliminate the danger of time-delaying cave-ins.

The operation and maintenance costs of the roller are low, and by replacing as many as twenty or more laborers with hand tampers the equipment pays for itself within a short time. On the average job a single unit will roll as much as 2,600 linear feet of 4-foot trench in a day, packing down the dirt as fast as it is shoveled or back-filled into the trench. It may be used for rolling over all kinds of underground lines without damaging the cable or casing, providing, of course, that sufficient dirt is thrown over the pipe before it is rolled. The first layer should be from 10 to 20 inches in depth, depending upon the nature of the soil and the rest of the dirt is usually rolled in 6-inch layers.

A New Line of Underbody Hoists

A NEW line of seven underbody slant type hoist models of all-steel construction has been developed by the Wood Hydraulic Hoist & Body Co., Detroit, Mich., providing a hoist for every chassis capacity from one ton up.

The Wood Underbody Slant Type Hoist

Smooth, easy, quick lifting of loads is accomplished by the rolling wedge principle, which is standard Wood hoist design and construction. The powerful outward thrust of the piston rod is transformed into greater lifting force by the action of the rollers on the cams, which are mounted on special seamless steel tubular supports and are attached to the longitudinal body frame members by pressed steel brackets. The greater lifting power is gained by the slanting position of the cylinder. The hoist begins its lifting action at a point ahead of the load center and requires less pressure to lift even the heaviest loads. By applying the lifting force to the longitudinal members of the body subframe, which is the strongest part of the body, undue stress or strain on the hoist, body and chassis are avoided.

The cylinder supports, both front and rear, are dropped-forged steel. Stay rods have been eliminated and the hoist front support is drop-forged steel of monopiece construction. The gear pump, driven by a power take-off attached to the truck transmission, pumps oil under pressure into the cylinder, forcing the piston and rod outward. The pump draws its oil supply from the low-pressure end of the cylinder.

Two levers in the driver's cab, give complete control and accurate, fast dumping of loads. The hoist is raised, lowered or held in by intermediate position by operating these levers, stopping automatically at fully raised and fully lowered positions.

The Saw Horse Folded Up for Transportation or Storage

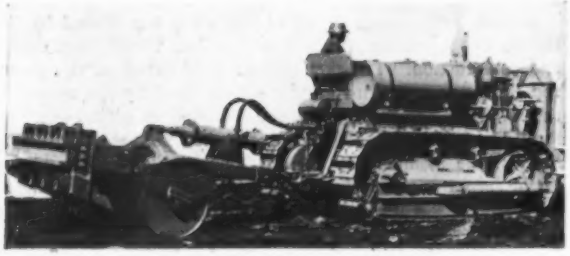
A Folding Saw Horse

A FOLDING saw horse made of wood and steel which can be easily folded up and transported from one job to another has been developed by J. P. Beasley, 2301 Wesley St., Greenville, Texas. Each leg of the horse is made half of wood and half of metal, the metal being bolted to the wood and held by a brace to keep from extending too far. There is a support midway up the metal portion, and when the legs are opened this keeps the legs from separating too far. The measurements are those of any standard saw horse.

A New Type of Explosive

A NEW development in an explosive which will do the work ordinarily requiring gelatin dynamite at a considerable reduction in blasting costs has been accomplished by the Hercules Powder Co., Wilmington, Delaware. This new type of explosive, known as Gelamite, combines the safety and economy features of the high ammonia content dynamites with the more water-resistant characteristics of gelatin, at the same time being plastic and easy to handle. It is adaptable to either open or underground shooting.

Gelamite is calculated to serve as an all-round useful explosive and is produced in three strengths, to replace the old style gelatins and extra gelatins of 30 to 60 per cent strengths.



The Ateco Hydraulic Scarifier

A Hydraulic Scarifier for Use With Tractor

DESIGNED for use with a Caterpillar Sixty, the Ateco scarifier, made by the American Tractor Equipment Co., 5301 Horton St., Oakland, Calif., has a main frame of cast steel, and tooth standards also of cast steel with special heat treated reversible steel teeth held in position in the sockets in the standards with knurled wedges. These standards, of which there are five, are spaced 12 inches apart, the niches for the standards in the main frame being so arranged that the teeth may be staggered. These standards are easily removed should the work be too heavy for the tractor to pull the scarifier with all five teeth.

The wheels of the scarifier travel on the hard ground ahead of the scarifier frame so that the depth to which the teeth are cutting may be quickly and accurately controlled. By means of the Ateco hydraulic one-man control the scarifier can be regulated to dig to any required depth within the range of the machine, which is 24 inches with the teeth clearing the ground 6 inches when raised. The depth of the cut and the height of the teeth above the ground when raised can also be regulated by raising and lowering the standards in the main frame. The weight of this scarifier is 5,600 pounds.

This Ateco hydraulic scarifier is interchangeable with the Ateco hydraulic dirt mover and tamping roller, and can be used in combination with the bulldozer on the same tractor, as when the tractor is equipped with the Ateco hydraulic one-man control, it is ready for operating all Ateco tractor equipment.

Some Recent Developments in Well Drilling Machines

THE commonest form of well drilling machine is that which operates with a chisel bit used as a combination chisel and hammer, and striking a gravity blow, the bit being suspended on a cable and raised and lowered by means of some mechanism on the surface of the ground. Until recently the material used for the structure of well drilling machines and rigs was universally wood, but within recent years structural steel has been used to some extent. This makes possible a lighter, stronger and more durable frame. Another improvement is the use of wire cable. Since the capacity of most drilling machines is determined by the length and diameter of their cable drums, the substitution of wire cable, which is much less in bulk, has greatly increased the depth capacity of the machines on which it is used.

A Traction Well and Blast Hole Drill Equipped with Dual Cushion Shock Absorbers

With the adoption of the structural steel framing for well drills and steel line for drilling cable, the great advantage of resiliency was lost. Experienced well drillers had for years been accustomed to drill on what they call "the spring of the cable," and it is believed that this method of operation gives a very high degree of efficiency in cable tool drilling. It therefore became necessary to devise some means of absorbing the shock and of introducing a substitute for this factor of resiliency.

Dual rubber cushions, which are located on an extension of the walking beams at the rear, have been developed by the Keystone Driller Co., Beaver Falls, Penna. The machine shown in the illustration is a No. 3½ Keystone well drilling machine, equipped with a 35-horsepower cross-mounted 4-cylinder gas engine, rubber tired wheels and the dual rubber cushion schock absorbers for operation with wire line. This machine is of wood frame construction. It is adapted for blast hole drilling in quarries, in which case the mounting would consist of plain iron steel wheels, or half crawler apron wheels, and for water wheels where rubber tires are essential.

The New Miami Shovel Mounted on a Tractor

A New Shovel for Tractors

A NEW piece of equipment recently added to the line of the Miami Trailer-Scraper Co., Troy, Ohio, is the Miami front-end shovel for use with Caterpillar Ten, Fifteen and Twenty tractors. This shovel is made in both low and high lift models, the low lift having a dumping clearance of 30 inches while the high lift has a dumping clearance of 6 feet. The low lift models is designed especially for the quick economical movement of loads of material for short distances while the high lift model is used extensively in the loading of material into trucks or bins.

This shovel is constructed of high carbon plate, strongly reinforced by angle irons. The overhead cable carrying frame is hinged to the tractor treads to equalize the treads in operation. The operating cable provides for an equal lift on each side arm. A short-circuiting device is provided so that the shovel may not be raised beyond a stated maximum height. The shovel bucket is dumped by means of a dumping lever and rope, the shovel then being righted to its original position by a righting lever and rope. The shovel has a capacity of 8 to 9 cubic feet for the Model Ten, ½-yard for the Model Fifteen, and ¾-yard for the Model Twenty.

This unit is interchangeable with the Miami bulldozer. In changing to the bulldozer equipment it is necessary to remove but four bolts where the shovel attaches to the extended axle of the tractor. The unit also interchanges with the Miami backfiller as well as the Miami wheeled scraper, providing four power operating units for the contractor with but one tractor and winch.

This company has steadfastly refrained from implications and claims which, while literally true, might mislead the readers of its advertising. This series of advertisements will set forth some facts which, we hope, will assist our readers to positive assurance concerning the most satisfactory solutions of their pumping problems.

THE LABOUR CO., INC.
H. E. LaBour

Do the Job Better with *Centrifugal* Pumps

ALTHOUGH comparatively few people can explain the reasons for the phenomenon, nearly everybody knows that a bucket of water may be swung in a vertical circle so that at times it is upsidedown, without spilling a drop. It is *centrifugal force* that pushes the water against the pail, and keeps it from falling out. This tendency of all matter to fly out from the center of its revolution is the principle on which centrifugal pumps are based. You can observe this principle by punching a hole in the bottom of your can or bucket and noting that the water will be thrown upward when the bucket is at the top of its circle.

There are two general classes of pumps—*positive displacement* and *centrifugal.* The former class moves water by *pushing;* it depends on pistons, diaphragms or rotating pockets which fit closely and move the water because it cannot slip by. Close fitting of the moving parts is absolutely essential to the operation of a positive displacement pump—you can imagine what would happen if a piston had generous clearance on all sides.

Centrifugal pumps do not push the water—they *throw* it. By whirling the liquid at high speed they cause it to fly out, away from the center, and a suitable opening is provided to carry the water in the desired direction. LaBour Pumps have no close clearances, hence water containing sand or other abrasives cannot reduce their effectiveness as in other types of pumps.

In LaBour Centrifugal Pumps there is but one moving part—the single impeller or paddle wheel that whirls the water. Contrast this simplicity with the multiplicity of moving surfaces necessary for a positive displacement pump. This simplicity, plus the absence of close clearances, and the fact that—in LaBour centrifugals—there is no valve of any kind, makes for long uninterrupted service on the most severe kinds of jobs.

This is the first of a series of advertisements which we shall endeavor to make a veritable primer of pumping. Reprints may be had for the asking.

THE LABOUR CO., INC.
ELKHART, INDIANA

LA BOUR PUMPS

NEVER LAY DOWN ON THE JOB

Eight-Yard Truck Bodies for Carrying 38,000 Pounds on Road Job

THREE chain-drive Sterling dump trucks, made by the Sterling Motor Truck Co., Milwaukee, Wis., and equipped with bodies of the scoop and head-board type with hydraulic underbody hoists, made by the Wood Hydraulic Hoist & Body Co., Detroit, Mich., are hauling 8 yards of dirt at water level capacity, on a unique piece of construction work for the Guy F. Atkinson Co., on the Status Pass road to Yakima, Wash. These three units, serving a 2-yard Bucyrus steam shovel, hauled over 1,800 cubic yards of excavation in a little less than 16 hours.

The rear wheels of these trucks are equipped with 44 x 10.50 Goodyear balloon tires, the gross weight on them when the trucks are loaded being 38,000 pounds. This heavy load is not legal on improved highways and these heavy trucks are intended for use on grading jobs only.

One of the 8-Yard Dump Wagons in Use on the Guy F. Atkinson Job Near Yakima, Wash.

A New Small Convertible Excavator

A NUMBER of improvements in the design of small excavators have been incorporated in the new Model 4, recently developed by Orton Crane & Shovel Co., 608 So. Dearborn St., Chicago, Ill. Outstanding among its features are the speed and ease with which it can be handled while digging, hoisting, swinging or traveling. It is equipped with a 40-horsepower 4-cylinder gasoline engine which is provided with an accelerator arranged for both hand and foot operation, electric starter, oil filter, air cleaner and other accessories.

Power is transmitted by means of a multiple-disc clutch, the transmission shaft being mounted on anti-friction bearings. Connecting the transmission shaft to the propelling clutch shaft is an enclosed alloy-steel chain with floating take-up. By use of the engine clutch the double-jaw propelling clutches can be shifted as easily as a friction clutch of the gear type, and the traveling speed can be varied from 5/8 to 3 miles per hour. This wide range gives high traveling speed, together with great tractive effort for traveling on rough ground.

The treads are of the self-cleaning type, and are driven by heat-treated alloy-steel bushed roller chains on large-diameter hardened sprockets, provision being made for take-up of both treads and chains. Coil springs back up each set of treads, thus protecting the operating mechanism from undue strains and shocks, and distributing the weight of the machine uniformly on the shoes when traveling over uneven ground.

The New Model 4 Convertible Excavator

Extra heavy construction is a feature of the carbody, which is electrically welded throughout. No strains are imposed on the pivot post by the superstructure, and a special brake is provided so that the shovel is not forced away from the work when the dipper is being crowded. Power shafts are made of heat-treated chrome alloy steel and all high-speed gears have cut teeth with wide faces.

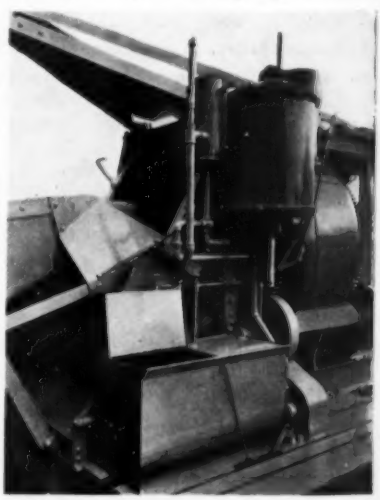
The shovel is equipped with a 16-foot heavily constructed and electrically welded boom and a 12½-foot electrically welded dipper stick with numerous diaphragms. The normal speed of the crowd is 85 feet per minute, with a thrust on the dipper of 10,000 pounds.

Model 4 is readily convertible to shovel, crane, dragline, ditcher or skimmer, and changes to these attachments can be made in the field. An extension of the cab for the operator's position gives a clear view of the work on both sides of the machine, and the levers are conveniently located. Each function of the Model 4 is controlled by a separate lever, and the control and speeds are arranged so that it is impossible to make five trips per minute in regular operation.

Calcium Chloride Equipment

IN some states it is now permissible to use calcium chloride for the quick curing of concrete and under such practice, the proper equipment for dissolving, measuring and introducing the solution, is a necessary requirement. To meet this need, the Foote Co., Inc., Nunda, N. Y., has brought out a calcium chloride equipment which is compact and simple and yet embodies all features called for in the most rigid specifications.

This equipment consists of a two-compartment, round-bottom mixing tank. Each compartment or tank has four beveled mixing blades set right and left hand, which agitate the water and chloride and make a complete solution of the material and keep it agitated until it is used. The solu-



MultiFoote's 1930 Calcium Chloride Equipment

What Does This "HUNT PROCESS" Do For Me?

Easy to apply

Absolutely uniform

Perfect wearing surface

"What *is* this 'Hunt Process' and what does it do for me?"

A straight-from-the-shoulder question and here's the answer in plain words:

The "Hunt Process" is a curing method which consists of spraying freshly-poured concrete with a processed asphalt compound, preventing evaporation of the mixing water and effecting an ideal cure.

If you're a paving contractor, the "Hunt Process" can hasten the acceptance of the job and let you collect your money sooner. And you can be sure it will always meet every curing requirement.

Or if you're an engineer, the "Hunt Process" settles your curing questions — gets the most out of the concrete — eliminates curing irregularities and disputes — promotes concrete quality control and builds your reputation.

The taxpayer, too — and both the engineer and the contractor must always consider him — has strong preferences for the "Hunt Process." It eliminates the dust and dirt of the old curing methods and reduces traffic delays to a minimum.

More about the "Hunt Process" is contained in a booklet which the coupon below will bring to you post-haste.

McEVERLASTO, INC.

111 West Seventh Street, Los Angeles, California

35 East Wacker Drive, CHICAGO, ILL. — 1754 Braybar Bldg., NEW YORK, N. Y. — 1314 Magnolia Bldg., DALLAS, TEXAS

OFFICES IN PRINCIPAL CITIES

Please send me your illustrated booklet and details of your inspection service.

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City_____ State_____

C. E. M—August 31

tion in one tank is being mixed while the solution in the other tank is being used.

The solution in either tank is carried through the strainer and mechanically operated pump into the measuring tank, where it is measured by an overflow pipe which has a long thread, allowing for the height to be adjusted to give the exact quantity desired. The surplus supply from the pump is automatically carried back to the tank from which the solution is being pumped. As the pump runs continuously, this keeps the pump line clear and aids in keeping the solution in agitation.

The measured solution is admitted to the mixing drum by the action of the three-way valve operated by the skip. This allows the chloride solution to flow from the measuring tank into the drum through the water pipe where it is thoroughly mixed with the water entering the drum for regular mixture of the concrete.

A New Rotary Concrete Surfacer

A CONCRETE surfacer adaptable for finishing and smoothing concrete, eliminating form marks, finishing granite and similar materials, and rounding corners and edges, has recently been announced by the Chicago Pneumatic Tool Co., 6 East 44th Street, New York. This CP No. 88 employs the rotary principle, having a series of four vanes which rotate on a spindle in a casing having suitable openings for the admission and escape of compressed air.

The CP No. 88 Rotary Concrete Surfacer

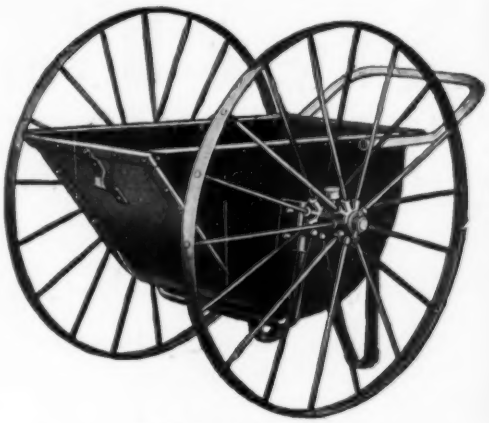
The tool is governor controlled, non-vibrating, has a removal air strainer, heavy duty radial and thrust ball bearing on the wheel end, renewable hardened rotor line, the rotor being mounted on an over-capacity ball bearing. There is an automatic oiler in the rotor housing with adequate grease plugs in the handle and gear case ends.

A Carefully Designed Concrete Cart

AN outstanding new feature of the General concrete cart, made by the General Wheelbarrow Co., Cleveland, Ohio, is the exclusive loop riveted to the front of the cart. It is a wide bar of steel which enables a laborer to haul the cart with a rope or chain without punching a hole through the hopper. Another feature is a removable axle bushing, which is a simple steel sleeve on which the wheel turns and which keeps all wear away from the axle.

The legs of the new General concrete cart are short enough to give ample ground clearance when the operator bears down on the handle. The handle is bent a few inches higher than the hopper, and the hopper, 29 inches from the ground, goes under the mixer, taking the full charge and holds 6 cubic feet to the line of the rivets an inch below the top. The sides of the hopper are flanged all the way around—front, back and bottom—and are both riveted and welded.

The whole frame around the top is built to be unbreakable. The steel angle at the rear extends out on both sides above the handle and is riveted to the side angles. The wide bar



The General Concrete Cart

across the front passes around the corners, and is also riveted into the side angles.

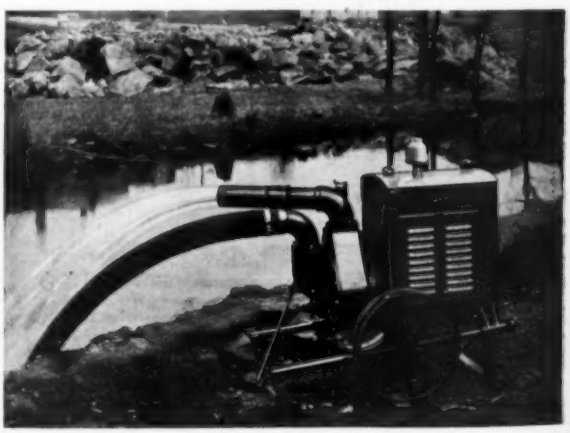
Additional features noted by the manufacturers are the high-carbon steel axle, which is heat treated and the temper drawn to a high degree of toughness; the broad flat wearing renewable shoes riveted to the legs and the large grease cups on the wheels.

The total weight of the cart is 250 pounds, the wheels are 40 inches in diameter with 36 or 42-inch diameter wheels furnished if desired. The cart is 38 inches wide over all and has an under-slung axle, unconditionally guaranteed against breaking or bending.

A New Portable 4-Inch Pump

A RECENT addition to the line of portable equipment manufactured by the Homelite Corp., 71 Riverdale Ave., Portchester, N. Y., is the new self-priming portable 4-inch centrifugal pumping unit with a built-in gasoline engine.

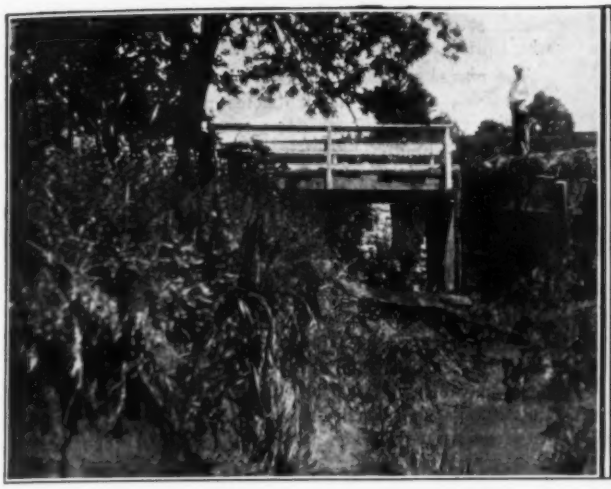
As in other Homelite units, this pump is self-priming without the use of auxiliary pumps or vacuum apparatus. The pump capacity is 25,000 gallons per hour and the suction lift is 20 feet. It has a bronze impeller of the open type and is powered by a Le Roi 8-10 horsepower, 4-cylinder gasoline engine. The complete unit weighs 730 pounds.



The New Homelite 4-Inch Self-Priming Centrifugal Pump

Photo to right shows 84" GOHI Corrugated Culvert as installed by the state of Nebraska. These photos appear on page 798 of the 1927-1928 report of the Secretary of Public Works of that state.

Before *and* After



Solving Drainage Problems in Nebraska *with*

Corrugated Culverts

GENUINE OPEN HEARTH IRON — GOHI — TRADE MARK — PURE IRON - COPPER ALLOY — REG. U.S. PAT. OFF.

(Meet copper-bearing pure iron requirements in all accepted specifications for corrugated metal culverts.)

This large diameter GOHI Corrugated Culvert, installed by the State of Nebraska, is a practical demonstration of the economy and efficiency of this modern type.

Made of GOHI Genuine Open Hearth Iron, which is guaranteed 99.90% pure iron-copper alloy.

Thousands of culvert installations have established the extreme resistance of this metal to corrosion, its long life and low-cost-per-year service. GOHI Corrugated Culverts that have been in the ground for more than 20 years are still giving 100% drainage service.

Easy to handle . . . quick, low-cost installation. Once in the ground, the job's finished. No repairs, no upkeep costs. Write any of the GOHI fabricators below for technical service on any installation.

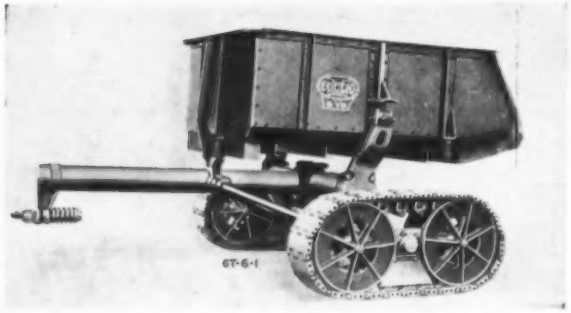
GOHI Corrugated Culverts are made in sizes to meet practical demands, from 8" to 96" and in thickness from 16 gauge to 8 gauge, depending on diameter. Made in any length in multiples of two feet.

All GOHI Corrugated Culverts have guaranteed 2-ounce pure spelter coating, scientifically applied.

GOHI CULVERT MANUFACTURERS, INC., Newport, Ky.

Central Culvert Co. Ottumwa, Iowa	**Feenaughty Machinery Co.** Portland, Oregon	**The Pennsylvania Culvert Co.** Philadelphia, Pa.	**Tennison Brothers** Oklahoma City, Okla.
Denver Steel & Iron Works Co. Denver, Colo.	**Lincoln Steel and Forge Co.** St. Louis, Mo.	**Roanoke Sales Corp.** Roanoke, Va.	**Tennison Brothers** Texarkana, Ark.
A. N. Eaton, Metal Products Omaha, Nebr.	**The Newport Culvert Co.** Newport, Ky.	**St. Paul Corrugating Co.** St. Paul, Minn.	**Capital City Culvert Co.** Madison, Wis.

Caro'ina Culvert Co., Salisbury, N. C.



A Gravity Rear End Dump Wagon for Use with a Caterpillar Thirty

A Gravity Rear End Dump Wagon

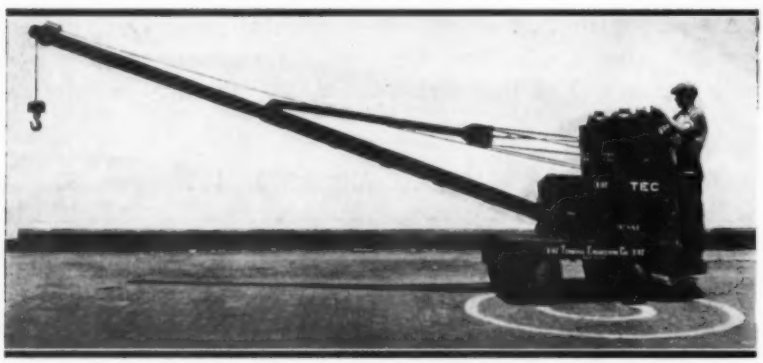
A NEW piece of earth moving equipment especially designed for working in rock, sticky clay or gumbo has recently been announced by the Euclid Crane & Hoist Co., Road Machinery Division, Euclid, Ohio. This gravity rear end dump wagon, built on the Euclid Track-Wheel crawler-type chassis, is fast, has a capacity of 6 yards and can be pulled easily by a Caterpillar Thirty.

This wagon is built in one size only to operate on shovel work. It is operated by the tractor driver, who by simply giving a slight pull upon a rope, releases a catch which permits the load to dump and the body rights itself automatically ready for reloading.

A New Heavy Duty Electric Crane for Material Yards

A NEW type of heavy duty crane with a capacity of 3,650 pounds at a distance of 2 feet from the end of the chassis, or 750 pounds at a distance of 14 feet and with a boom which is telescopic over a distance of 6 feet, has recently been placed on the market by the Terminal Engineering Co., 17 Battery Place, New York, N. Y. The boom and hook are operated independently from two separately driven hoist units each with its own motor and controller.

Where crowded conditions make easy maneuvering a vital point, and in jobs where it is necessary to have a long reach horizontally as well as vertically, this crane is particularly well adapted. The four-wheel drive with no mechanical differentia's but with a motor on each wheel gives a maximum amount of traction, and hence these trucks are especially suited for operation in all kinds of weather.



The TEC Industrial Crane with Telescoping Boom

In order to give a maximum counterbalancing effect, the machine is so designed as to concentrate as much weight as possible over the wheels away from the load. In cases where the load is great enough to throw nearly all the weight on the wheels near the hook, thus reducing the traction on the other wheels, the crane still has motive power, because all wheels are driven by individual motors. The usual two-wheel drive truck cranes are not thus equipped to carry heavy loads. When the wheels at the driver's end tend to leave the ground, the two-wheel drive machine loses the major part of its traction.

The maximum height of lift is 17 feet 6 inches on the stadard model, although longer booms may be furnished. The machine can pass through doorways as low as 72 inches when the boom is lowered.

Power is supplied to the crane from a storage battery which is large enough to operate an electric magnet as well as to perform the propelling and hoisting duties. The battery is carried in one unit in a steel container, and can be changed easily by the driver using an overhead hoist.

Loads can be carried with this truck even over rough ground, as the boom is hinged to the truck frame and not to a superstructure mounted on a pivot. The turning radius is so short that loads carried hanging on the hook can be swung about a point only 2 inches from the side of the truck. The load is thus always kept safely over the center line of the chassis, no large space is taken up with deadweight counterbalance, and there is no slewing mechanism to be damaged by shock from rough roadways.

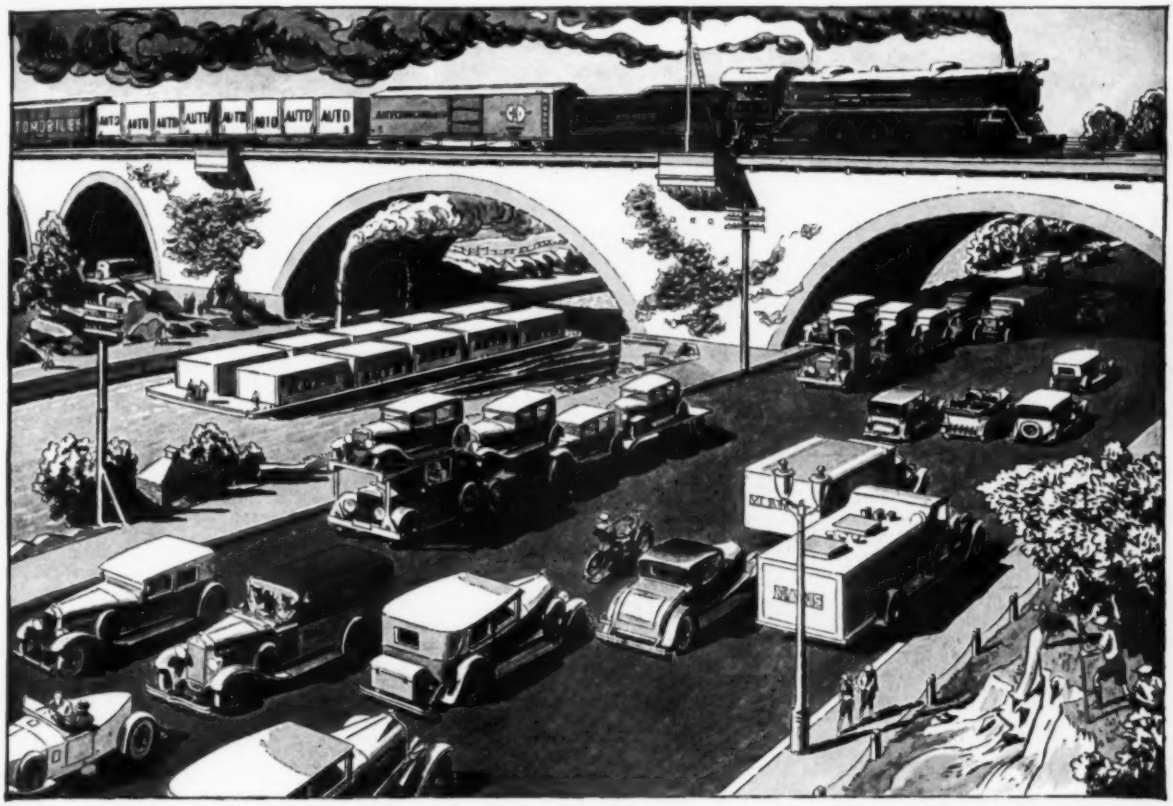
The New Ingersoll-Rand Utility Hoist

A New-Sized Portable Air Hoist

A NEW-SIZED Utility portable air hoist of 2,000-pound capacity, which is designed for use on derricks for hoisting buckets for caisson work, pulling cars, skidding timbers, handling pipe, operating clamshell or orangepeel buckets, hoisting material, pulling sheet piling, driving piles and similar work on construction jobs, has recently been announced by the Ingersoll-Rand Co., 11 Broadway, New York. These hoists are of comparatively light weight and are readily moved about wherever there is work to be done. They can be bolted to a timber or mounted on a post or steel column in any convenient location.

The Utility uses a radial, 4-cylinder counterbalanced reciprocating-piston-type air motor which is reversible. All wearing parts and cylinders are easily renewable and the cylinders are also interchangeable. The reduction gears between the motor

..and 15,000 new cars *every day*



It's easy to talk of over-production of automobiles. But why not turn the whole proposition inside out—and speak of under-production of roads?

Under-production—not only because we spend too little on roads but also because we so often spend it on roads that cost too much.

"Good roads at low cost" is the only answer to the mounting birth rate of automobiles. *At low cost* means more miles of good roads from every million of the nation's two-billion-dollar annual road bill.

No road-building, road-maintaining material has better right to associate itself with the words "Good roads at low cost" than Tarvia. For 26 years, Tarvia has been helping thrifty communities put the low-cost principle into practice.

This priceless experience is at the service of any highway official who cares to use it. 'Phone, wire or write our nearest office.

The Barrett Company

New York	Chicago	Philadelphia
St. Louis	Minneapolis	Boston
Detroit	Cleveland	Birmingham
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THE BARRETT COMPANY, Ltd.
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Tarvia
GOOD ROADS at LOW COST

and drum are all machine-generated spur gears, heat-treated wherever necessary to insure ample strength and wearing qualities. The gears are completely enclosed in a dustproof housing, permitting the gears to operate in a bath of semi-fluid grease. The bronze throttle valve is tapered and fitted into a bronze bushing. A clutch of the positive jaw type is used to disengage the motor and is thrown out by an eccentric shaft controlled by the clutch lever. This lever is located on the top of the hoist, and automatically locks to hold the clutch either engaged or disengaged. The brake is of the band type, and is operated by a lever conveniently placed and adjustable to any of six operating positions.

The New Byers Model 40 Shovel

A Convertible ⅜-Yard, ¾-Swing Shovel

A NEW ⅜-yard, ¾-swing clean-up shovel which is convertible and weighs less than 10 tons, has been announced by the Byers Machine Co., Ravenna, Ohio. This machine, known as Model 40, is similar in design to the Byers full-circle models. The direct type of drive from motor to jackshaft by silent chain, and then to each working operation is the same as that found on the ½, ¾, 1 and 1¼-yard machinery decks. All deck machinery is mounted in one unit steel casting, with Timken roller bearings, worm boom hoist and power clutches. The crawlers operate with double steer through a single 5¼-inch diameter travel shaft in the car body.

The independent cable crowd shovel attachment, clamshell, dragline, trencher and skimmer attachments are easily handled. The shovel crowd operates by a cable and is reversible by a single independent lever. The machine is powered by a 36-horsepower motor which develops a powerful single line pull at 140 feet per minute.

An Improved Hydraulic Bulldozer

AN improved hydraulic bulldozer, designed for all models of Cletrac tractors, has been developed by the Essex Engine & Machine Corp., Belleville, N. J. Among the features of this improved unit is the rugged subframe surrounding the entire tractor and attached to it without interfering with the normal action of the tractor. To this frame, as a base, the operating mechanism is mounted in such a manner as to control the blade and push-arms from both sides, thus keeping the blade in a normally level position with respect to the tractor. The trunnions are attached to the tractor's dead axle shaft and are so located as to give a direct horizontal thrust to the plow push arms.

The specially designed control valve makes possible positive control of the blade under pressure, both when elevating and lowering the blade into action or holding it rigid at any desired elevation throughout its range. By means of a relief the blade may be allowed to float, that is, raise up when the load gets too heavy and again drop to its set position when passing over the obstruction.

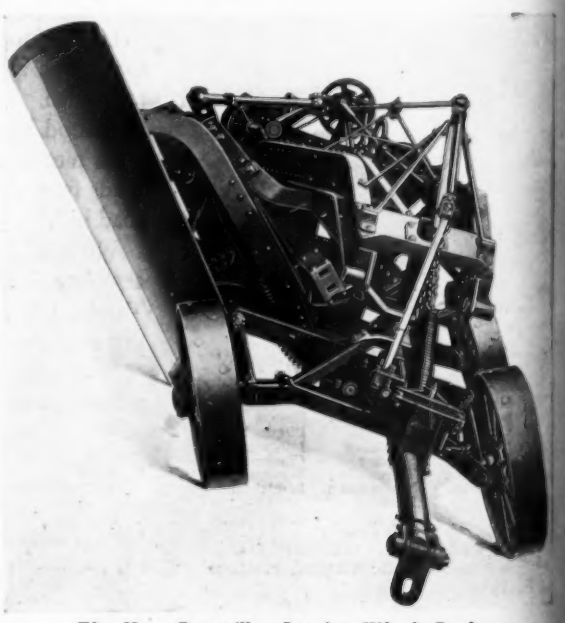
Another feature is the location of the oil tank which, in addition to being protected from damage by enclosure in the subframe, gives a clear and unobstructed vision to the rear.

A New Leaning Wheel Grader

A NEW grader for use with a Caterpillar Sixty, featuring a 42-inch lateral side shift of the blade that can cut a bank of 60 degrees slope, has been announced by the Caterpillar Tractor Co., San Leandro, Calif. This grader, besides introducing the new feature of blade control, reach and range, also has the feature of leaning wheels. It is the heaviest of the Caterpillar blade graders, weighing 11,300 pounds without the scarifier, and has a centralized control system by which seven control wheels govern the nine important adjustments of blade pitch and position, wheel adjustment and steering.

Correct pitch of the blade at all times, whether cutting or drifting is made possible by its feature of 3-point control. The wide range and reach of the blade, made possible by the 42-inch lateral side shift, by the three positions of the connecting link between the side shift and circle crossbar, by the three-blade position connections with the blade beams and by four positions at the extensible lifting links. The blade is thus enabled to make a high reach for bank cutting of 6 feet 6 inches and can cut a slope of 60 degrees.

The entire lifting mechanism is mounted on roller bearings, with tapered roller bearings in the worm shaft, double row ball bearings on the lift shaft and roller bearings for the compensating lift spring sheaves.



The New Caterpillar Leaning Wheel Grader

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